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Supply and Demand

by ELLSWORTH WOODWARD

SOME months ago I suggested to our president that the interest—one might say anxiety—voiced by many magazine writers in what appears to be a shortage in practical results on the part of the art schools, would be a profitable subject of inquiry.

With his customary swiftness in disposing of such matters, Dr. Pickard requested the present writer to make the inquiry. What follows is the outcome of a questionnaire directed to a considerable number of manufacturers who employ designers, and whose business is of such importance as to give their opinion authority.

The number of replies was somewhat disappointing, although one readily appreciates that the nature of such an inquiry might involve more time and consideration than could be given at the moment, and also that the proper person to make a reply might not be available at the time. However, sufficient material came to hand from these sources, together with the flotsam of the press and the writer's personal experience, to seem worth presenting.

It is well known that there are two types of art schools in the country. One concerns itself with the education of those who purpose following the pictorial arts. These usually include sculpture and sometimes architecture. The other school devotes itself to training designers, and those who are to pursue the manual arts. Both schools often combine all these objects; but our present inquiry, following the suggestion of the economists, is with the school of design.

It is said that there are not enough of such schools and that the graduates of those we have are not definitely prepared to meet the needs of industry.

In this connection the published statements of the Woman's Wear Company are very interesting. Three

years ago this energetic company instituted a competition in silk design and it has continued to do so each following year.

The outcome of these competitions has been commented upon by representatives of thirteen important manufacturing concerns. I quote a number of these comments as they appeared in the report published by *Woman's Wear*.

Mr. Bret of Marshall Field Co. says of the 280 designers who submitted work, that the success of this venture gives ground for hope "that the United States will be recognized as a world style creating center, and will thus enable our American-made productions to be illustrative not only of successful mechanical achievement, but also of an art that is typically American."

J. A. Migel & Co. says: "The fact that I purchased a considerable number of designs is a certain indication of what I think of this exhibition. The knowledge that we have such artists among us should be enough; the problem of developing them belongs to industry. I am happy to say that the designs bought were not only artistically successful, but were also a striking commercial success. The work of all the schools reflects credit upon them."

Mr. Hanson of Mallison & Co. says: "This collection of designs is infinitely superior to anything I have seen in Europe in past years."

Roessel & Co. says: "The artists have not only produced beautiful ideas but have put them into practical form. They have mastered the machine technique and have acquired a style that is simply remarkable."

Mr. Scheier of Rosenthal & Co. says: "I never thought I would see such a collection of designs in America by Americans. It is no strain on my memory to recall the time when we arranged our patterns from foreign samples, and this is a stupendous improvement. No one can doubt the ability to design in America, and we can only wonder at the lack of vision which kept us at the old methods so long. We feel personally grateful

to the various forces that have disturbed themselves for our benefit."

The foregoing quotations from such representative users of design seem to dispose of two current criticisms at once, that is, that designers are not available and that schools have failed to prepare their pupils to meet practical requirements.

Two hundred and eighty designers seems a good number to be brought forward by a call for a single kind of design. Moreover, we note that the designs are declared to be beautiful, to possess fresh and original qualities, to be practical and a commercial success.

These conclusions, so frankly expressed by practical men, seem also to cast doubt on the wisdom of the request so often urged on schools to fit their pupils to the precise usage of the various industries.

Every teacher of experience realizes that his greatest difficulty and most urgent responsibility is to secure power and breadth in the training of his students. If, in his desire to meet the quite natural desire of the pupil to specialize and secure a paying position as soon as possible, the teacher narrows his exercises to apply to the tricks of some prospective trade, the student will be incapable of leadership, even in the craft of his choice, for all the crafts governed by taste depend for their very life upon the power to grow and change with the hour which supports them.

It is, of course, necessary for the school to be conscious of a definite relation between its pupil's studies and their future application, but to give this idea precedence is, to say the least, a danger. There is also an unfair economic burden in the suggestion that the school employ the services of the factory expert to give finishing courses in the specialties, in order to smooth the passage of the pupil from school to employment. Is it not fair to suppose that the few weeks necessary for the young designer to learn the short cuts and intensive methods of the factory would be better spent in the workshop itself?

Between the college graduate and the business world there has always been the same difficulty. The

satirical paragraphs in the newspapers which always appear at commencement time remind us of it. To bridge this gulf the business college was devised. Even the orthodox college has its department of business administration, and no doubt all these contrivances have their value, but we also know that much remains for the young man to learn when he enters the office, which somehow the school could not impart, and as I firmly believe should not be expected to impart in full measure.

We may, I think, dismiss our fears, if we have any, as to whether the art school is awake to its responsibility. All school directors of my acquaintance have an attentive ear to the ground, alert to the tremors of criticism, and active in the introduction of improvements.

But to return to my inquiry. The great manufacturing house of Gorham & Co. tells me that the major part of its designing and craft working force is made up of Americans, trained in American schools. Everyone knows the output of this tremendous shop, and many are also familiar with the friendly and helpful relations it has toward the art school which was founded some forty years ago in its home town. The reactions in this instance are easy to trace and of a satisfactory nature.

In reply to my questions, Mr. H. B. Cheney said in part: "Paris was before the war, and probably will be again, the style center of the world, which does not mean that all style was created in Paris, but only that it was there brought to a focus. It is extremely probable that in the future the sharpness of the focus will be somewhat disturbed and that America may have more to say about her own fashions. If she does, it is very certain that these tendencies and results will be quickly effective in Paris and to some extent in other fashion centers. The United States has for a long time done much in originating styles for itself. During the war we have been forced to rely very much upon our own resources and Paris has come to depend very much

upon us for suggestions. It is nevertheless true that probably in the future, as in the past, Paris will be situated more advantageously for designers than will New York or any other center, this being because the markets supplied through Paris are wider and more extended than those which can be reached through New York, London, or Vienna. Consequently, designers in Paris will have a larger field to absorb their work and can therefore get more work than in New York. The number of designers that can be permanently employed and occupied by manufacturers in the United States is very small. If one designer finds a good idea and spreads it broadcast throughout the whole textile field, nobody wants it. Consequently his opportunities are somewhat limited. It is our opinion that a designer, unless he or she can be permanently employed by one of the very few people who have forces of designers, will of necessity need to be much more versatile than a Paris designer in order to succeed. It is improbable that one designer could concentrate on silk designing alone, for instance, with success. Such a designer with real talent can make a place for himself provided he keeps more or less to one manufacturer in each class and tries to cover a number of fields, such as silk designing, cotton designing, pottery, china decoration, and illustration. You will see that this needs higher and more trained types of designers than those who can make a success in Paris. That is the difficulty of our situation."

Speaking for Tiffany & Co., Mr. Albert A. Southwick writes: "The old apprenticeship system all over the world is gradually passing, and the only substitute now in sight is the technical school. For the trades in which a jewelry or silversmithing house is interested, an instruction period such as is offered by a school is generally too short. Some hours a week for only part of the year can hardly be expected to give results that are comparable with those of the old system when the attendance lasted for years with long hours of daily and often continual contact with the masterworkman.

"The only apparent reason why European schools should show rather better results than American, is that the harder conditions of life generally existing naturally produce habits of attention and industry which have not been imposed here in the same degree on either the schools or the scholars. The decrease in the skill of the worker and the consequent decline in quality of product which are universally recognized and deplored, are the results of changed conditions to which modern life has not yet become adjusted. The workman uses more complicated tools than were known in earlier times—the production has been greatly increased—and the separation of the processes of manufacture has tended to produce a workman, and has introduced a new factor, the designer, who is oftentimes not familiar with the execution of the work as a whole.

"In Tiffany & Co's designing work all the several heads of departments are native born, and they have the great advantage of being continually associated with the execution of the work designed under their direction. Nearly, if not quite, all the designers employed by the house are native Americans. Very few among them have had any considerable art school training in the sense in which the term is generally used."

It would extend this paper unduly to quote further from many opinions expressed by men apparently quite conscious of the economic relation between school and business, and anxious to contribute their share in appropriating the full value to America of the unprecedented opportunity the times have brought about.

One remark already quoted from Mr. Migel stands out with arresting sharpness, "The knowledge that we have such artists among us should be enough; *the problem of developing them belongs to industry.*" Many art educators have said this, and all of us have more or less felt the need of something which the school could not supply.

Nine-tenths of the efforts to incorporate intensive methods into the school and to place the trained pupil in a job for which he or she was trained have come from

the school. The manufacturer maintained a critical if not a hostile attitude, demanding from the school a skilled designer and craftsman, fully acquainted with his special methods, forgetting that his is only one of a dozen specialties, and that the school by such reasoning would be compelled to maintain a dozen factories with as many experts in addition to its essential art training facilities.

When industry as a whole realizes that its present status and its future expansion have intimate connection with the school, we shall see a change no less than the shifting of the art center of the world. It is squarely up to the manufacturer.

There is one other equally pressing duty, and this rests squarely on the merchant and the public, namely, the word *imported* must be assigned only its face value. At present this word is imbedded in our minds as a synonym for *superior*. It tips the scales of judgment in favor of purchase even at an advanced price. When the product in question *is* superior in beauty and workmanship, we will regretfully acquiesce in the justice of the situation. But it is not always true, and it is increasingly less true.

There should be a consistent propaganda of education to break down this artificial standard. Educate at home, make at home, buy at home, and rejoice at home and abroad in our capacity to do at least as well as the other self-respecting nations of the earth.

A Student of Ancient Ceramics, Antonio Pollajuolo

by FERN RUSK SHAPLEY

WHEN one speaks of the influence of the antique upon Renaissance figurative art, it is classical sculpture, either in relief or in the round, that is immediately called to mind; and it is this phase of ancient art, almost exclusively, that students of the Renaissance have considered. For obvious reasons, this attitude is largely justifiable. Renaissance literature and art both give rich evidence of enthusiasm for classical sculpture. Many examples of ancient sculpture that have come down to us are mentioned in Renaissance records of contemporary collections and are copied, often quite frankly, in Renaissance sculpture and painting. Such precise reference is comparatively rare in the case of classical painting and minor arts. Yet it is hard to understand why, in the analysis of the Renaissance debt to antiquity, arts of so much importance originally and of such abundant bequest to posterity as Greek vase painting and Arretine pottery should so long have been left almost entirely out of account.

Already in the 13th century Greek vases of ancient importation, as well as great quantities of the red Arretine ware, had been excavated and were highly prized in Italy. Both were at that time and even much later thought to be of indigenous production. Ristoro d'Arezzo describes in his *Libro della composizione del mondo*, completed in 1282, the finds of vases in his native town. On these vases, he tells us, "were designed and modelled all varieties of plants, leaves, and flowers, and all kinds of animals imaginable . . . they are in two colors, blue¹ and red, but usually red." "On some are modelled figures, thin and fat, laughing and

1. Although he writes *blue* (*azzurro*) instead of *black*, Ristoro is undoubtedly referring to Greek pottery here. He is not aware that the black and red painted vases are Greek but considers them, as

crying, dead and living, old and young, nude and draped . . . ' There is no limit to Ristoro's praise of the work on the vases, and it seems that others of his time were equally enthusiastic, for he says that "when sculptors, designers, or other connoisseurs got any of these fragments, they looked upon them as sacred relics, marvelling that human nature could rise to such a height in refinement, in craftsmanship, in the form of these vases, in the colors, and in the modelling; and they say: 'those craftsmen were divine' or 'those vases fell from heaven.' " ² In the middle of the 14th century Giovanni Villani gives us a brief notice of the continued discovery of Arretine ware; ³ and about two centuries after Ristoro's account Vasari, who follows Ristoro in thinking that the red and black painted ware is Arretine work, tells us of his grandfather Giorgio Vasari's interest in the vases. Giorgio, according to the biographer, busied himself at the potter's profession in Arezzo. Through his study of ancient vases he rediscovered the secret of their red and black coloring. He was also so fortunate as to unearth outside the town part of an ancient kiln, and, besides many fragments, he found there four whole vases, which he presented to Lorenzo the Magnificent upon the visit of that prince to Arezzo. ⁴ Finally, a letter, published by Müntz, from one of Lorenzo's agents at Venice tells of the proposed addition to Lorenzo's collection of three antique vases which had recently been imported from Greece. ⁵

With these last accounts we come to the time of the Renaissance painter with whom we are here concerned. This painter, Antonio Pollajuolo, had as the patron of some of his most characteristic work Lorenzo the

well as the examples in relief, a product of Arezzo. (See Schlosser in Austrian *Jahrbuch*, vol. XXIV, p. 154.)

2. Ristoro d'Arezzo, *Libro della composizione del mondo*. The Italian is repeatedly quoted, e. g., by Fabroni, *Storia degli antichi vasi fittili Aretini*, p. 12 ff. and by Schlosser, *op. cit.*, p. 152, note 2. An English version is given by G. H. Chase, *Loeb Collection of Arretine Pottery*, p. 9 and *Catalogue of Arretine Pottery* (Museum of Fine Arts, Boston), p. 4.

3. See Fabroni, *op. cit.*, p. 16.

4. Vasari's *Lives*, trans. by G. de Vere, vol. III, p. 54 ff.

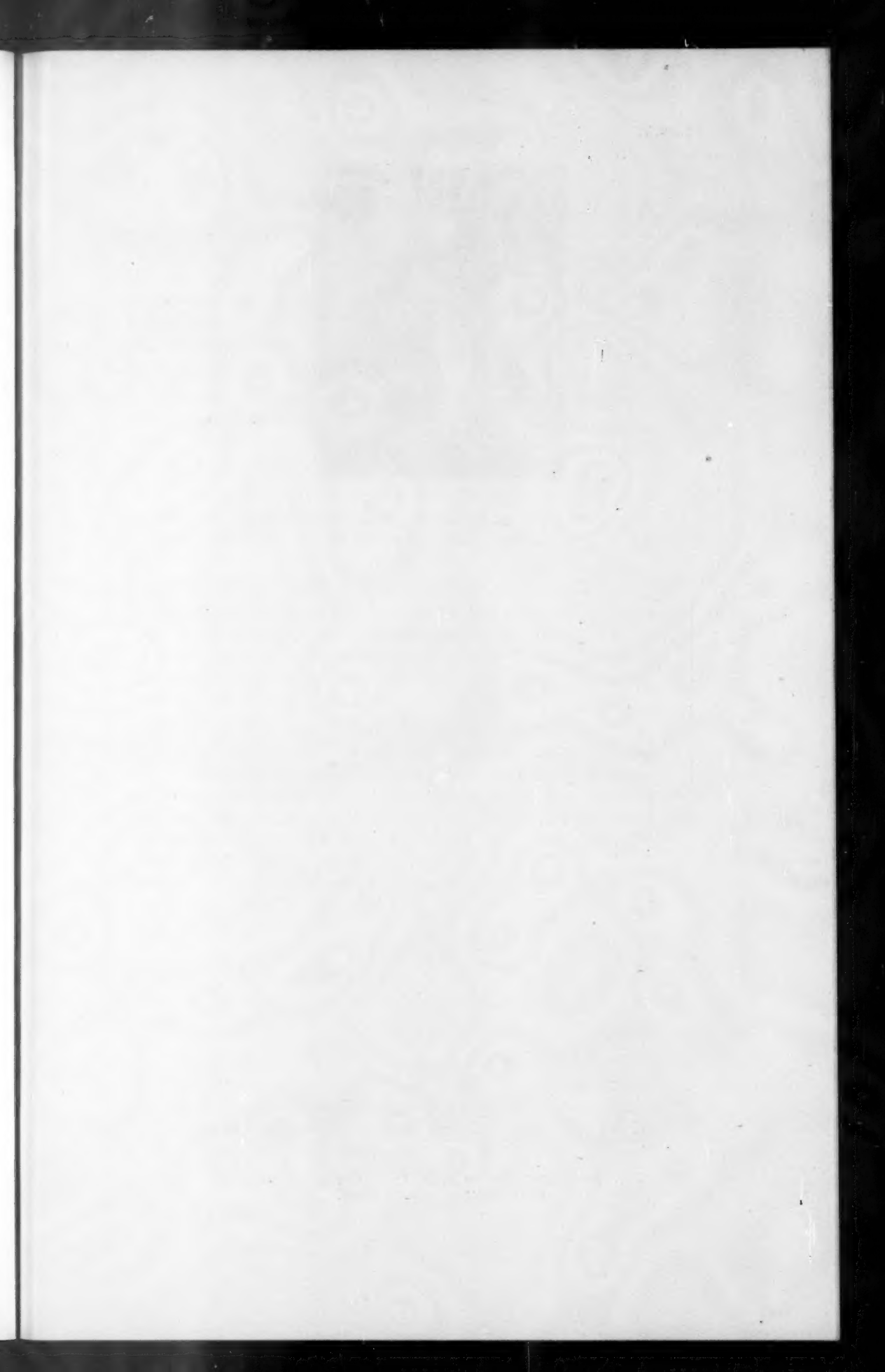
5. Müntz, *Les collections des Médicis au quinzième siècle*, p. 57.

Magnificent, whom we find interested in collecting ancient vases.

Now Antonio Pollajuolo's fame has rested chiefly on his realism. He was an innovator in Florentine art, basing his work upon a direct study of the human body made by dissection and by observation of movement. But with his undisputed original realism he combined peculiarities of movement and composition which find their prototypes in red-figured Greek vase paintings, and more especially in those of the "severe" period. Two considerations make it immediately clear that one cannot, however, as if it were a case of ancient sculptures, point to definite Greek vases as the ones from which any Renaissance painter has necessarily drawn his inspiration. In the first place, our records of individual vases do not date back so far as the Renaissance. In the second place, types of figures and forms of compositions, when once created by a Greek vase painter, became common property and were repeated again and again. In the case of Antonio Pollajuolo we have the additional fact that he was too deeply interested in anatomy to have slavishly copied the comparatively stereotyped, schematic vase figures.

The movement expressed in Antonio's paintings has always been their most noticeable feature and one of the most difficult to analyze, as witness the conflicting comments made upon it by critics. Berenson finds the artist "one of the greatest masters of movement that there ever has been, one of the ablest interpreters of the human body as a vehicle of life-communicating energy and exulting power."⁶ Maud Cruttwell, his most extensive biographer, speaks with enthusiasm of his scientific presentation of movement. "Never," she says, "have rapid movement, vehement gesture and the violence of brute force been better rendered . . . even Signorelli, Michelangelo, and Leonardo—those great masters of vehement movement—have never surpassed him. And he can be equally successful in rhyth-

6. Berenson, *Florentine Drawings*, vol. I, p. 19.





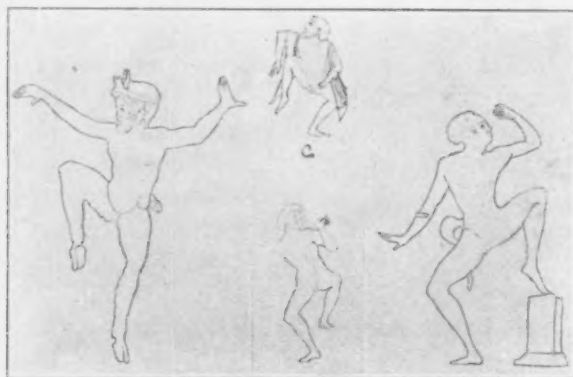
a b c
Fig. 1—ARCETRI, VILLA DELLA GALLINA: Detail of Fresco by Pollajuolo.



Fig. 2—WINGED FIGURE FROM A GREEK VASE (mirror-wise).



Fig. 3—SILENUS FROM A GREEK VASE (mirror-wise).



b a d
Fig. 4—ARCETRI FIGURE (Fig. 1, a) Compared with Examples from Greek Vases.

mic as in rapid movement, in quiet as in violent action."⁷ On the other hand, he is reproached by Crowe and Cavalcaselle for "rigid and exaggerated action," for "affected action," and for lack of grace in movement.⁸ Cox calls his figures ungainly⁹ and Perkins speaks of their extravagance and mannerism.¹⁰

These attitudes and movements of Antonio's figures, giving at once the impression of intense, realistic life and of unreal, superhuman contortion, are precisely the peculiarities that impress one in Greek vase paintings, particularly of the 5th century.

Let us look first at what remains of the sadly mistreated frescoes of the Villa della Gallina (in the grounds of the Torre del Gallo, Arcetri, near Florence), "works that are accepted as entirely by Antonio's own hand and as most characteristic of his genius" (Pls. V and VI, figs. 1 and 6). The similarity of these frescoes to the familiar subject of the Bacchic Dance in Greek vase paintings ought to strike one immediately. Of the manner in which the light-colored figures stand out against the dark background we shall speak later, as also of the dependence almost entirely upon line for the indication of form and muscle. But note now the extravagant movement of the bodies, how they seem to spring into the air, fall at once into the attitude the artist has chosen and remain fixed so. We have the peculiar sensation of witnessing the preceding movement rather than the usual sensation of anticipating the following action. Take, for example, the youth seen from the front (Pl. V, fig. 1, a and fig. 4, a; the latter is an outline drawing). The same paradox of static movement, as well as a striking similarity of contorted pose is found in the three figures taken from Greek vases and placed above and at the sides of the Pollajuolo

7. Cruttwell, *Antonio Pollajuolo*, pp. 28 and 40.

8. Crowe and Cavalcaselle, *History of Painting in Italy*, ed. Hutten, vol. II, pp. 375 and 377.

9. Cox, *Painters and Sculptors*, p. 21.

10. Perkins, *Tuscan Sculptors*, vol. I, p. 223.

dancer in fig. 4.¹¹ Comparison with the one at the right is particularly satisfactory because the position of the legs and of the arms corresponds most closely to the fresco figure. The motive of action, however, seems somewhat more closely paralleled in the other two, where there is no support under the upraised foot.

The beautiful forward-rushing figure in the fresco (Pl. VI, fig. 6), which seems to be the best preserved of the five, may also have been inspired by any one of many Greek types. It is shown here (Pl. VI, fig. 5) in outline drawing between two figures from the famous cylix in Cracow, which is assigned by Hartwig to Euphronius.¹² The wild abandon of the dance expressed by the Greek artist in the figure at the right with head thrown back and open mouth is a worthy model for any artist. Omitting every accessory detail, both the classical and the Renaissance work seem to have but one goal, the expression of the most vigorous, exhilarating movement; and it must be admitted that, in spite of his advanced anatomical knowledge, Antonio has not quite so nearly attained the goal as has Euphronius with his far more conventional means.

Though not so close to Antonio's figure in the expression of forward movement as are the figures of the Cracow cylix, the Silenus from a vase in the Hermitage (Pl. VI, fig. 7¹³) furnishes an interesting parallel for the position of the arms and legs, and the parallel is the more obvious when the figure is seen mirror-wise, as it is also shown here (Pl. V, fig. 3). With the upper part of the Silenus' body another of the figures of the fresco is more closely analogous (Pl. V, fig. 1, c). Here the body is seen more from the front, the arms and

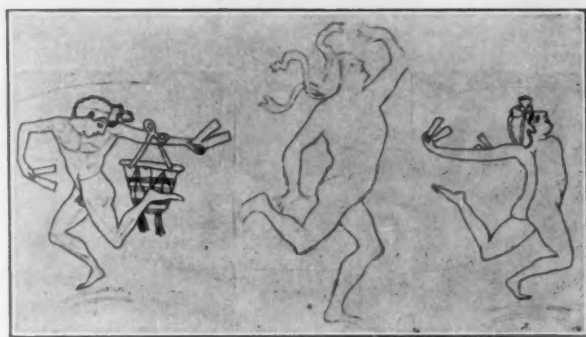
11. b, from a vase in the Ducal Museum of Gotha, *Élite des Monuments* . . . , vol. III, pl. 90.

c, from the volute crater in Arezzo, Furtwängler-Reichhold, *Griechische Vasenmalerei*, pl. 62.

d, from a vase in the Louvre, *Élite des Monuments* . . . , vol. IV, pl. 31.

12. Hartwig, *Die griechischen Meisterschalen* . . . , pl. XI.

13. *Compte-Rendu de la Commission Archéologique*, Atlas, 1869, pl. VI, 3.



^b ^a ^c
Fig. 5—ARCETRI FIGURE (Fig. 6) Compared with Ex-
amples from a Greek Vase.



Fig. 6—ARCETRI, VILLA DELLA
GALLINA: Detail of Fresco by
Pollajuolo.



Fig. 7—SILENUS FROM A GREEK
VASE.





Fig. 5—ARCETRI FIGURE (Fig. 6) Compared with Examples from a Greek Vase.



Fig. 6—ARCETRI, VILLA DELLA GALLINA: Detail of Fresco by Pollajuolo.



Fig. 7—SILENUS FROM A GREEK VASE.



hands are arranged much as are those of the Silenus (Pl. V, fig. 3), and the peculiar movement, in which the forward rush of the body is interrupted by a backward swing, is repeated.

The standing female figure (Pl. V, fig. 1, b), which forms such a pleasing contrast with the dancing youths on either side, finds a more or less close parallel in a winged figure from an Attic crater with white painting (Pl. V, fig. 2¹⁴). The poses of the two are very much the same when one of them is seen mirror-wise, as is the vase figure here.

An ever recurrent peculiarity of Pollajuolo, the position of the hand turned back sharply at right angles to the wrist, is well illustrated in the Gallina frescoes. This peculiarity is no doubt very cogent in making the attitudes appear to some to be affected; but it does enhance the suggestion of tense, nervous movement. A similar effect is seen in many Greek vases, though Pollajuolo twists and contorts the fingers more. A particularly close parallel is on an early 4th century crater in Palermo.¹⁵ It should be compared with the arm and hand of the almost completely destroyed figure of the fresco (Pl. VI, fig. 6).

Two other paintings universally recognized as the work of Antonio are the little pictures in the Uffizi, presumably free replicas of the artist's large paintings of the same subjects, deeds of Hercules, executed in 1460 for Lorenzo de' Medici, who, we remember, had at least a few examples of Greek vases. The labors of Hercules were so commonly represented in classical art that there would have been no difficulty in finding a model. Many Roman sarcophagi are decorated with the subject. But there the hero is short, thick-set, and more compact in his movement. Here (Pl. VII, fig. 9), Hercules is tall and lean, with broad shoulders and narrow waist and a broad, striding movement—in short, the type of hero dear to the heart of the Greek vase painter. I need give for comparison only the familiar

14. Furtwängler-Reichhold, *op. cit.*, pl. 100.

15. *Ibid.*, pl. 59.

example on the volute crater in Arezzo, where the subject is Hercules combating the Amazons (Pl. VII, fig. 10¹⁶).

The same Hercules appears in the Rape of Dejanira in the Jarves collection at Yale University.¹⁷ And this type of figure is repeated in the man at the extreme left in the engraving of the Battle of the Nudes,¹⁸ as also in the study for this engraving (see below and Pl. VIII). Without stopping to illustrate in detail, the similarity of other parts of the engraving to Greek vase painting is apparent. The figure just at the right of the Hercules type runs with upraised club as do repeated examples on vases, and the striding movement throughout the whole composition suggests Greek prototypes.

In further connection with the Hercules type, we may consider the terra cotta bust of a young warrior in the Museo Nazionale, Florence.¹⁹ On the breastplate are modelled two groups representing deeds of Hercules. On the left he slays the Stymphalian birds, and on the right he strangles the serpents. Aside from some similarity in the figures themselves to Greek vase paintings, the compositions, with their circular boundaries for the figures suggest the decoration on the interior of a cylix.

Antonio's drawing of Adam (Pl. VII, fig. 8, a²⁰), crutched on his hoe, gesticulating with his left hand and resting his right hand on his hip, strikes one as rather ludicrous. And yet this posture was quite the fashion among Greek artists (Pl. VII, fig. 8, b, c, d, e²¹). Again

16. *Ibid.*, pl. 61.

17. Illustrated in Sirén's *Catalogue of the Jarves Collection*, p. 112.

18. Illustrated in Cruttwell, *op. cit.*, pl. XXIII.

19. Illustrated *ibid.*, pl. XII.

20. Given here in an outline copy. Illustrated in Berenson, *op. cit.*, vol. I, pl. XVI.

21. b, from a cylix in the Louvre, Hartwig, *op. cit.*, pl. LXVI.

c, from a vase in the Hamilton collection, *Collection . . . Hamilton* (1802), vol. III, pl. 34.

d, from a vase in the collection of M. de Paroi (1808), Reinach, *Peintures de Vases Antiques*, pl. 29.

e, from a vase in the Vatican, Reinach, *op. cit.*, pl. 43.

PLATE VII.

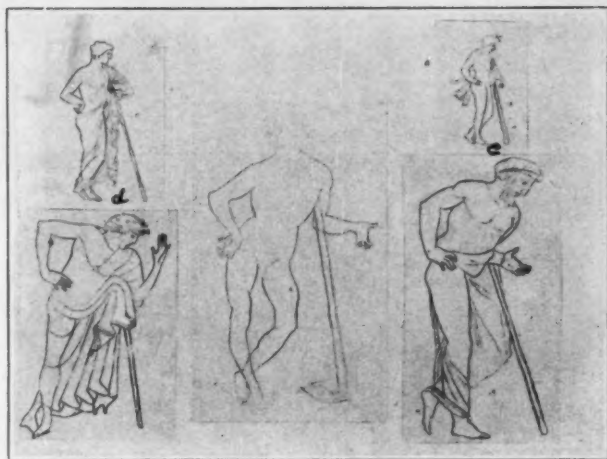


Fig. 8—POLLAJUOLO'S DRAWING OF ADAM compared with
Figures from Greek Vases.



Fig. 9—FLORENCE, UFFIZI: HER-
CULES SLAYING THE HYDRA BY
POLLAJUOLO.



Fig. 10—HERCULES FROM A GREEK
VASE.

PLATE VIII.



CAMBRIDGE, MASS., COLLECTION OF MR. PAUL J. SACHS:
DRAWING BY POLLAJUOLO.

and again we find the pose; with legs crossed, cane under left arm, left arm free, right hand on hip the men stand at ease, discoursing with one another, watching the gymnastic sports, or directing the work of the bottega.

The more finished and far more beautiful drawing (evidently part of a study for the Battle of the Nudes) in the collection of Mr. Paul J. Sachs, Cambridge, is useful for our thesis (Pl. VIII). Not only in the almost entire reliance upon sharp, clear outline, with few interior markings, but also in the use of a solid dark background against which the figures stand out in reddish-brown bistre does the drawing give the striking effect of a red-figured Greek vase. The well-known drawing of a Prisoner Brought before a Judge, in the British Museum (Pl. IX, fig. 11), gives the same effect as Mr. Sachs' drawing; and for these features of red-figured Greek vase treatment attention should again be called to the frescoes from the Villa della Gallina, with their light-colored figures done almost entirely with sure, clear outline, and placed sharply against a solid dark ground (Pls. V and VI, figs. 1 and 6).

Turning to another branch of Antonio's activity, the sculptures on the tomb of Sixtus IV show little or none of the influence of painted Greek vases. But precisely these sculptures would lead us to believe that our artist was not blind to the entirely different beauties of the red Arretine ware, which we mentioned in the beginning. The charming Arretine vases with their softly modelled, graceful figures, their flying putti, their clinging drapery, and their rich garlands and other abundance of decoration must surely have been admired by many artists of the Renaissance.²² One of the most common subjects with which they are decorated is the symposium scene, in some such form of composition as we see it on a vase in the Boston Museum of Fine Arts (Pl. IX, fig. 12, a and b). Notice particularly the female figure who holds with her right hand a lyre resting upon her knee, while she turns her head to look over her shoulder at the man behind (Pl. IX, fig. 12, a).

22. Cf. Chase, *Loeb Collection of Arretine Pottery*, p. 34.

The similarity between this symposium figure and the personification of Perspective from Antonio's tomb of Sixtus IV (Pl. IX, fig. 13) needs no comment. With the other female figure on this vase (Pl. IX, fig. 12, b) Antonio's Theology from the Sixtus monument shows much likeness.²³ The flying angel appearing here at the left might well have been suggested by the flying putto motive of the Arretine vases.

Let me repeat that the particular vases here used for comparison are not put forward as those which Antonio Pollajuolo knew. Further, there is no intention of suggesting that all of his work was inspired either by Greek or by Arretine pottery decoration. In spite of these reservations, however, the relationships which have been traced may be helpful in making intelligible the contradicting impressions of the artist's productions—their fixedness and movement, their jerkiness and rhythm, their awkwardness and grace.

23. Illustrated in Cruttwell, *op. cit.*, pl. XLIV.

PLATE IX.



Fig. 11—LONDON, BRITISH MUSEUM: DRAWING BY POLLAJUOLO.

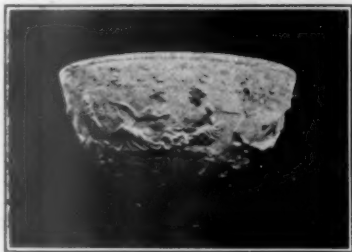


Fig. 12—BOSTON, MUSEUM OF FINE ARTS: ARRETINE VASE.

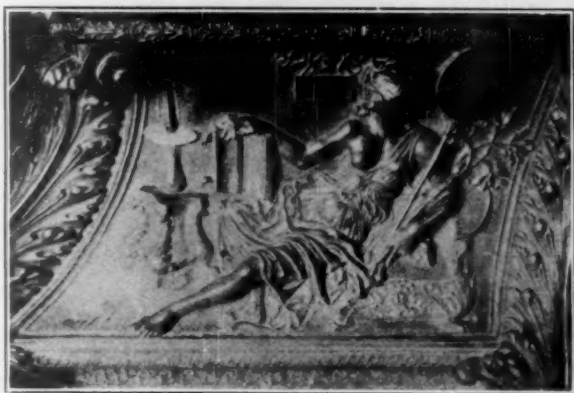


Fig. 13—ROME, ST. PETERS: RELIEF FROM THE TOMB OF SIXTUS IV BY POLLAJUOLO.



Antique Glass

by GUSTAVUS A. EISEN

GENERALITIES

ANTIQUE glass comprises vessels, beads, tiles, amulets, and other objects made of glass, inlaid with glass or otherwise decorated with glass. We may also include *glaze*, because the difference between glaze and glass relates principally to the manner in which it was employed. Glaze, paste, terracotta, porcelain, and similar substances were pliant when cold and moist. Glass, on the contrary, was made plastic by heat and fused by heat. Heat applied to paste made this substance hard. The term "paste" should on that account never be applied to glass and even the composite word *glass-paste* or *paste-glass* leads to confusion.

All objects made of antique glass deserve equal attention, careful study and scientific treatment. It is generally held that antique glass possesses only an artistic value, and in this sense it is exhibited in our museums and private collections. Although the decorative value of antique glass is very great, still we must now concede that such glass possesses other important qualities which make it an indispensable adjunct to historical, archaeological, and religious researches and which justify the most extensive collections.

The *artistic character* of antique glass relates to form, color, and technique, none of which have been equaled in modern times, but which could with profit be studied by our modern artists before they attempt to invent forms of their own. The colors of antique glass are softer and more harmonious than those now employed and thus they have inspired more than one prominent artist, decorator, and designer.

The *archaeological importance* is only now being fully understood. Both the form and color of antique glass underwent continual change, sometimes from year

to year, sometimes from generation to generation. Neither forms nor colors were repeated except at long intervals of time and then never with such an exactness that we may not readily separate the repetitions from the originals. On this account we now recognize that glass and glass beads furnish a more accurate means of dating the objects with which they were excavated than do coins, which were often hoarded up during generations.

The *historical and geographical value* of our glass depends upon the centralization of its manufacture in ancient times. Most of the ancient glass must have been made in Egypt, and only a limited quantity in Syria, Italy, Spain, and Gaul. From these centers the glass was distributed along trade routes, thus indicating the intercourse between different nations, and the manner in which they were dependent upon each other. With the glass and other merchandise went new ideas and improved manners and morals. The influence of beauty was often more lasting than that of the sword. The importance of glass in this respect is not confined to the Old World, but extends also to our American continents. Glass, as we all know, has been found in native tombs from Cape Horn to the Arctic and many efforts have been made to explain its provenance. It has even been suggested that the glass beads were brought here by the Norsemen, while others have held that the beads were manufactured here from "imported material." In order correctly to interpret the known facts, an intimate and correct knowledge of antique, mediaeval, and modern glass is necessary. It is far from illusory to assert that, if an intercourse between this country and the Old World existed in ancient times, this intercourse might best be verified by a study of the beads found in tombs. It has been stated that this assertion is greatly discounted by the presumed fact that the Venetians imitated the antique beads and that such imitations are undeterminable. This theory is wrong, however, from beginning to end, because the Venetians never knowingly imitated any antique beads. They had no knowledge

of such beads nor of the technique by which they were made. The earlier antique beads differ from the later ones to such an extent that they may be readily recognized, and only in case of plain, uncolored, spherical beads is there any difficulty of identification.

The *anthropological importance* of antique glass is highly interesting. As an example, it may be stated that beads of glass, fig-shaped, first appear in the tombs of the 9th to 8th century B. C., and thus corroborate the already established theory that the fig tree was introduced into the Mediterranean basin about that time. In this manner we find the date of an important economical event, confirmed by archaeological investigations. Similarly, the introduction of an especially large quantity of dates from Egypt into distant countries was accompanied by vessels of glass imitating the fruit and its coloring. In tombs of the fifth century B. C. in Syria, Egypt, and Carthage we find elaborate and sometimes very beautiful beads of glass representing Assyrians, Persians, Syrians, Greeks, Scythians, Gauls, Nubians, and other as yet unidentified races, probably those with which the Egyptians at that time came in contact. If we remember that this was the period of the Persian invasion, these finds become highly interesting and even important. We also find in the same tombs heads of sheep, goats, and other animals, probably such as were made known to the Egyptians by invading tribes. It has been possible to separate nearly forty distinct types of such heads so sufficiently well characterized and technically perfect as to be recognized with considerable certainty.

The *religious nature* of antique glass has not hitherto been insisted upon, so far as I know. Still, we must recognize its importance, because many glass vessels or representations on glass were intended to illustrate objects sacred to pagan, Christian, and Jew. In pagan glass we recognize vessels and other objects sacred to Bacchic rites. Among the Jewish religious objects we find the candlestick and the vessels of the Temple, perhaps even the "garden of delight" which

consisted of a decorative vine of gold with leaves and clusters. Among the Christian religious objects I have recognized chalices, mystic vases, the vessels of Joseph of Arimathaea, and various other legendary, traditional, and mystic objects reflecting upon the Passion of Christ, and upon the rites and traditions of the early Church. When compared with various representations on the walls of the catacombs, upon sarcophagi, stelae, and epitaphs, these objects receive an importance not hitherto suspected. They furnish us with material of which, so far, no one has made any special use.

The *educational value* of antique glass consists in its beauty of form and color, in the objects imitated or represented, which when explained to the undeveloped mind must stimulate it as does a fairy tale. The wonderful iridescence of antique glass, the marvelous harmony of even a fragment of mosaic glass, needs no explanation to be appreciated, and such specimens in the home or in the school would illuminate and gladden the heart. They would constitute a center of attraction and wonder to old and young. Art should be taught before morals, because art tends to improve morals, but morals do not necessarily create art. If the art of nations were taught instead of the wars of nations, the object of teaching and education would be more easily attained. The art of nations makes all nations akin, but the history of wars of nations has principally had the effect of creating enemies; art should be taught before anything else. In the writer's opinion no objects are better suited for that purpose than antique glass.

ARTISTIC, HISTORICAL, AND ARCHAEOLOGICAL PERIODS

Period of Glaze

The origin of glass is uncertain, but it seems probable that it developed from glaze. Glaze was already in use in Egypt about one thousand years before the first dynasty, the earliest objects covered with glaze being made of pottery and stone. The earliest glaze was pale green in color and of sufficient durability to have lasted to the present day. During the period of glaze,

great advance was made in technique, and in the 12th dynasty we find glaze which is both durable and beautiful. From that dynasty I have seen beads which, though made of paste and glazed, were almost as translucent as glass. Two Horus eyes dated from that dynasty, one in the University Museum in London, and the other in a New York collection seem actually to be of glass. But the date of these two objects is not indisputable and as no glass vessels have been found before the 18th dynasty we are forced to assume that it was not until 'that time that glass became generally known, even if it had been invented long before.

A study of glaze is of great importance, not only from a purely artistic point of view, but because it changed from time to time, sometimes improving, sometimes degenerating in quality, color, hardness and gloss. The glaze thus furnishes us with means of dating and identifying many objects, not otherwise determinable. During the 12th dynasty the glaze was almost imperishable, and beautiful in color. In the 8th and 9th centuries the glaze had degenerated to such an extent that its color is now hardly recognizable.

Period of Core-spun Glass

This name is suggested for the period during which vessels were produced by winding threads of plastic glass around a core of soft clay. The threads were later fused together, pressed and smoothed out, and finally the core was scraped out, thus setting free the interior cavity. In this manner all the earliest Egyptian glass vessels were produced, and continued to be produced until the time of the Ptolemies, when the technique of tube-blown glass was invented. All the earliest glass was opaque and milky owing to numerous bubbles in the matrix, which, far from detracting from its appearance, added softness and harmony to the colors. The period began with the invention of glass in the 18th dynasty, and lasted over one thousand years. In the course of this period various improvements and discoveries were made which led to the production of vessels and beads of glass of unsurpassed beauty of

coloring. Pure white, transparent glass began to appear in the 9th to 8th century, but remained scarce for a long time and could only be employed for beads. The decoration of the surface consisted of "dragged" patterns of glass threads, rods, and bands. At first the eye-spots were plain without rings, but already during the 19th dynasty eye-spots with concentric rings became common. All such eye-spots were made by superposing successive drops of glass, and by rolling these out to a flat surface. The lower layers would thus project and appear as rings.

The "dragged" mosaic patterns must have originated from the use of glass threads in forming the glass vessel. An accidental disturbance of the threads may at once have shown that by moving them intentionally desirable patterns could be produced. The colors of this period are soft yellow, blue, brown, green, and dull violet. The intense red was not in use. During this period glass-workers imitated onyx, agate, carnelian, and various precious stones and marbles, but did not reproduce the forms of crystals. The beads were usually made in the same manner as the vessels, by winding a thread of glass around a wire, or by pushing a rod through a lump of plastic glass. Stripes of various colors were made by connecting parallel rods, which were diminished by being fused and drawn, and later ground off so as to become flat. Miniature work of this kind has been found in the Palace of Amenhotep at Thebes. At a later period the same effect was produced by grinding off a single, dipped or composite rod.

The end of this period falls in the time of the Ptolemies and may conveniently be considered to coincide with the date of the death of Alexander.

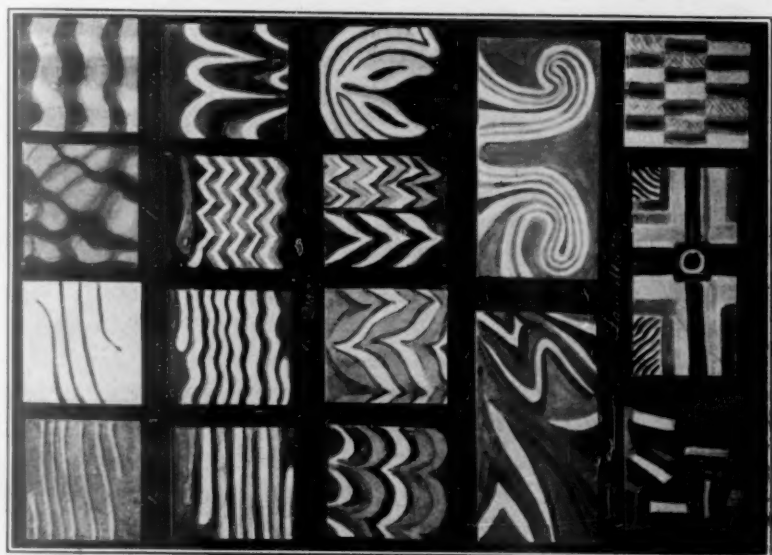
Period of Tube-blown Glass

In the time of the Ptolemies the city of Alexandria became the principal center of glass-making. Encouraged by art-loving monarchs, epoch-making discoveries and improvements were made which brought the art to the highest degree of perfection, if beauty alone is considered. These improvements revolution-

PLATE X.



G. A. Eisen, del.



G. A. Eisen, del.

SURFACE MOSAIC GLASS.



ized the art and inaugurated a new period. Tube-blown glass vessels, stratified glass, dipped rods, and moulded glass flasks were invented. The process involved in each of these will require attention to make clear their nature and importance. The earliest attempt to blow glass was made by first producing a tube of glass, closing one end, then enlarging the closed end by blowing into the open end. The stratified glass process consisted in placing layers of differently colored glass one upon the other, and after fusing the layers, cutting off the mass transversely in strips. Of these trips tubes were made, and the tubes blown into small, delicate flasks. The third epoch-making discovery was that spots surrounded by concentric rings could be quickly and cheaply produced by simply coating a rod with different concentric layers. Small disks cut off from this rod possessed about the same appearance as the former stratified eye-spots. An artisan could with the new method produce a thousand such spots where formerly he made but a dozen. Another important discovery was that glass could be moulded and prevented from adhering to the mould by coating the latter with ashes, brickdust, or some such powder.

Besides these improvements, a new kind of glass—the *gold glass*—was invented. This glass was made by inclosing layers of gold-leaf between layers of transparent glass. The layers were then fused and thus permanently preserved. This technique was but an off-shoot of the stratified glass, and we possess many flasks made of stratified glass in which one or more of the layers consists of gold glass. Such glasses began to appear in the third century and lasted to the first century B. C. The gold glass itself continued in use a thousand years longer, and was employed especially for the making of beads. This kind of glass will be discussed in more detail later on.

This whole period may be said to have lasted from the Ptolemies to the time of Pompey the Great, when columnar mosaic rod glass inaugurated a new era.

To this period, and in all probability to the stratified glass types, belong the flasks which Nero, in the

middle of the first century, bought for an enormous price, and which he exhibited together with fragments of murrina vessels in the Theater of Pompey. The vessels which Nero bought are described as "winged." The most likely explanation of this expression is that these "wings" were exceptionally thin, high fins, such as are sometimes found on flasks of stratified glass. They were not added after the bowl had been blown but were made at the same time, the mould being furnished with deep cavities into which the glass matrix penetrated. This seems certain because the stratification ascends from the body into the wings. Such glass was a lost art in Nero's time, hence the great price which he chose to pay. Several such flasks of moderate dimensions are to be found in New York collections.

Period of Columnar Mosaic Rod Glass

The difficulty of producing "variegated" glass flasks by means of stratification was enormous, and no artisan has since attempted to imitate those flasks—even during the Renaissance, when all older methods of glass-making were successfully improved upon by the Venetians. When and how the first columnar rods were invented is not known, but I assume that the manner in which this was done, was practically as follows: Some one probably noticed that when glass rods of different colors were stacked together in bunches, their assembled ends would show patterns of various colors. Thus, when a white rod, for instance, was surrounded by red rods, red rings were seen around a white core. The next step was to fuse the rods and to draw them out into smaller rods and threads. Glass threads had already been spun in the 18th dynasty, but so far no rods with colored centers or colored rings have been found to be earlier than the Ptolemies. Once the discovery of the fused rods had been made, there was but a short step left to the art of making columnar mosaic glass. Instead of merely placing a single colored rod in a mould and surrounding it with the white rods in the form of a ring, intricate patterns were now produced in this manner. Besides rods of glass, the artist made

use of plates of glass, both kinds often being combined. Thus, for instance, a thick rod of white glass was placed upright in a pottery mould, on a base of soft clay. Radiating from this core were arranged plates of white glass, like the arms or points of a star. The vacant spaces between the core and the plates were now filled in by a packing of rods of a different color, as, for instance, green. By fusing the aggregation enough to make the rods and plates form a solid body but not so much as to make them mix, and by cutting this mass into sections, a beautiful pattern of white stars in a green field was produced. By drawing out the cylinders minor rods and minor patterns resulted and these could be combined into more complicated patterns such as geometrical figures, portraits, plants, flowers, birds, fishes, and symbolic figures. In fact, with sufficient care and skill, any and every kind of pattern that could be painted by the artist's brush could also be produced by rods and plates.

Such a matrix in order to hold together had to be thick and therefore did not lend itself well to the production of flasks or even to open vessels and plates. But at about this time the art of shaping a flask or cup from a *glass bubble* had been discovered, and one of its earliest uses was the application of this new method to the production of mosaic cups from columnar rods. Just as we find that the earliest flasks made of stratified glass were heavy and thick, so we now find that the earliest cups made of columnar rods were much heavier than those made at a later date, when the process of grinding the cups to proper thinness had been perfected. The art of blowing glass from a bubble may have been derived from the technique of tube-blown glass, since the workers must have noticed that the greater the heat applied to the end of the tube, the thinner became the bottom of the flask. Still, it seems probable that the glass itself underwent an improvement and was made more readily fusible, which made it possible to produce flasks of such paper-like thinness as the Sidonian flasks of the first century A. D. We know that at first the glass was thick and difficult to blow, because

all the early mosaic glass cups are thick and heavy. In the process of production sections or fragments of mosaic glass were placed along the sides of a mould or simply on a plate, and then fixed together by means of a bubble of glass. The next step was to press the mass into a mould, and finally to thin the walls by grinding. Many specimens have been found which were left unfinished or which broke because the artist went too far in his eagerness. Many such specimens contain in their interior remains of the thick layer of the original bubble, which often is even thicker than the mosaic layer of the bowl. That this was actually the process employed in making these little cups is also verified by certain references in verse written by the Latin poets, who deplore the fact that the artisans of Egypt often continued to grind their vessels until they broke, spurred on by the hope of increasing their profits by asking a higher price for the thin-walled specimens of their craft.

The period of mosaic glass proper seems to have begun during the reign of the last of the Ptolemies and to have ended with the first Roman emperors. According to Kisa, who has had the best opportunity of studying this feature of antique glass-making, the "heavenly murrina" was not produced after the last of the Flavian emperors. With "murrina" Kisa associates, incorrectly, no doubt, the mosaic glass of this period.

Sidonian glass, which is most representative of this period, is especially worthy of mention because of its peculiar quality. The delicacy of this ware, like that of stratified glass, has never since been equalled. Whether the flasks are small or large, they are unsurpassed in refinement of form, color, and decoration. The last consists of symbols and relief figures drawn with taste and skill. Nero was the first to exhibit fine specimens of glass. In this, as in many other art activities, he was the leader of his time. Pliny, however, sneeringly remarks that Nero exhibited broken pieces of vessels, just as if they had been the remains of the body of the great Alexander! After the time of Nero a steady degeneration in taste continued during fifteen

hundred years, and it was reserved for Kircher, a priest in Rome, to found the first museum in that city. It is greatly to be regretted that the name of that first real museum—the Kircherianum in Rome—has been blotted out and its specimens scattered among various museums.

With the Sidonian glass of the first century ends the really great period of artistic glass. The culminating perfection, attained by the stratified glass of the Ptolemies, by the columnar glass of the Augustan Era, and by the Sidonian flasks, has never since been attained. The broken fragments, over which Nero shed his tears, could never be imitated. The greatness of the art of glass was lost forever! Until that time, glass vessels had been valued on account of their beauty and their technique. From that time on, indeed, up to the present day, glass vessels have been valued according to size, lightness of weight, and bizarre forms and decorations. Even now the beauty of antique glass is appreciated by very few and some of our museum exhibits are arranged according to size and general effect.

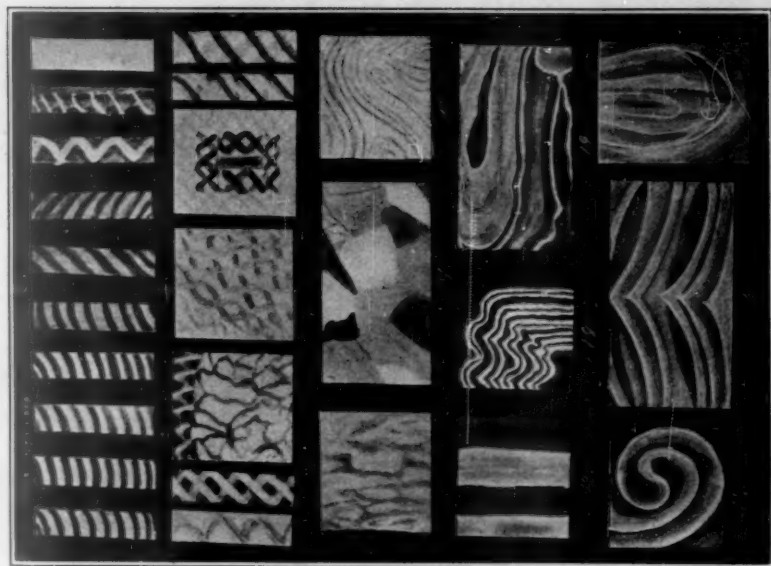
Period of Bubble-blown Glass

This period includes the time from the middle of the first century A. D. to the advent of the Arabs. Until the beginning of this period glass-making had been practiced principally in Egypt and Syria, but about the time of Pliny, who perished with the destruction of Pompeii, glass factories were established also in Italy, Gaul, and Spain. With this extension of the manufacture commenced the degeneration of the artistic and sober character of the craft. If we may judge from the statements made by Nero and Hadrian, in regard to glass, both of these art-loving monarchs preferred the older types to the new. The vessels of the whole period are characterized by an increase in size, undoubtedly due to the perfected technique of glass-blowing. Transparent white glass became common and was preferred to the colored specimens both for decorative and table use. Rare and fine specimens of both new and older types were preserved in the temples, and probably

also for purely decorative purposes in households. With the increasing demand for size came extravagant decorations and forms, which continued unabated until, through war and the migration of races, communication was interrupted and the ingredients for glass-making became rare. Mosaic and stratified glass disappeared at the commencement of this period and the perfect technique of the Sidonian glass was all but lost. The best types of the glass of this period were produced in the middle of the second century; the poorest at the end of the classical period.

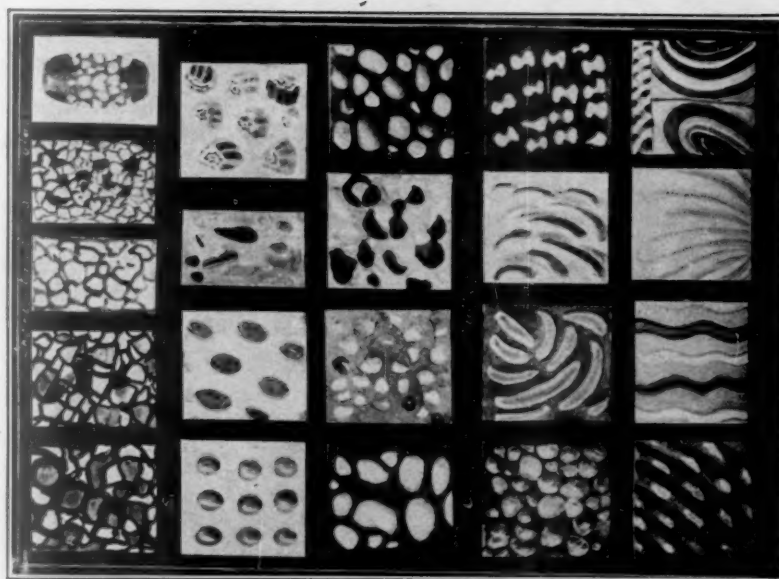
Kisa, in his generally admirable book on glass, divides the whole period of glass-making into ten minor periods from the time of the Ptolemies. Several of these periods are, however, now untenable, based as they are upon an imperfect dating of the typical specimens and because of the lack of recognition of the tube-blown glass. A thorough discussion of this subject is not possible in a short review, and only the mere outline of a practical subdivision according to centuries is possible. Even such divisions are, of course, not well defined, since changes in types and processes came gradually in glass-making as well as in other arts. The common characteristics of the six centuries during which the classical glass-making continued may be summarized as follows: Transparent white glass predominated over colored glass, and extravagant types over sober forms. Mosaic and stratified glass were not used in vessels, but only for beads. Technically, the types were: moulded, blown in a mould, blown from a bubble, and pressed. Reliefs and protuberances were produced in a mould, and decorations by stamps. The surface decorations consisted of glass threads, bands, rods, and drops. At first the vessels were small, but later they became larger, undoubtedly on account of a developed technique. White glass seems to have been preferred for household use. We shall now consider the minor divisions according to centuries.

First century, A. D. The forms were characterized by wide bowls, low stands, and narrow foot-disks, like

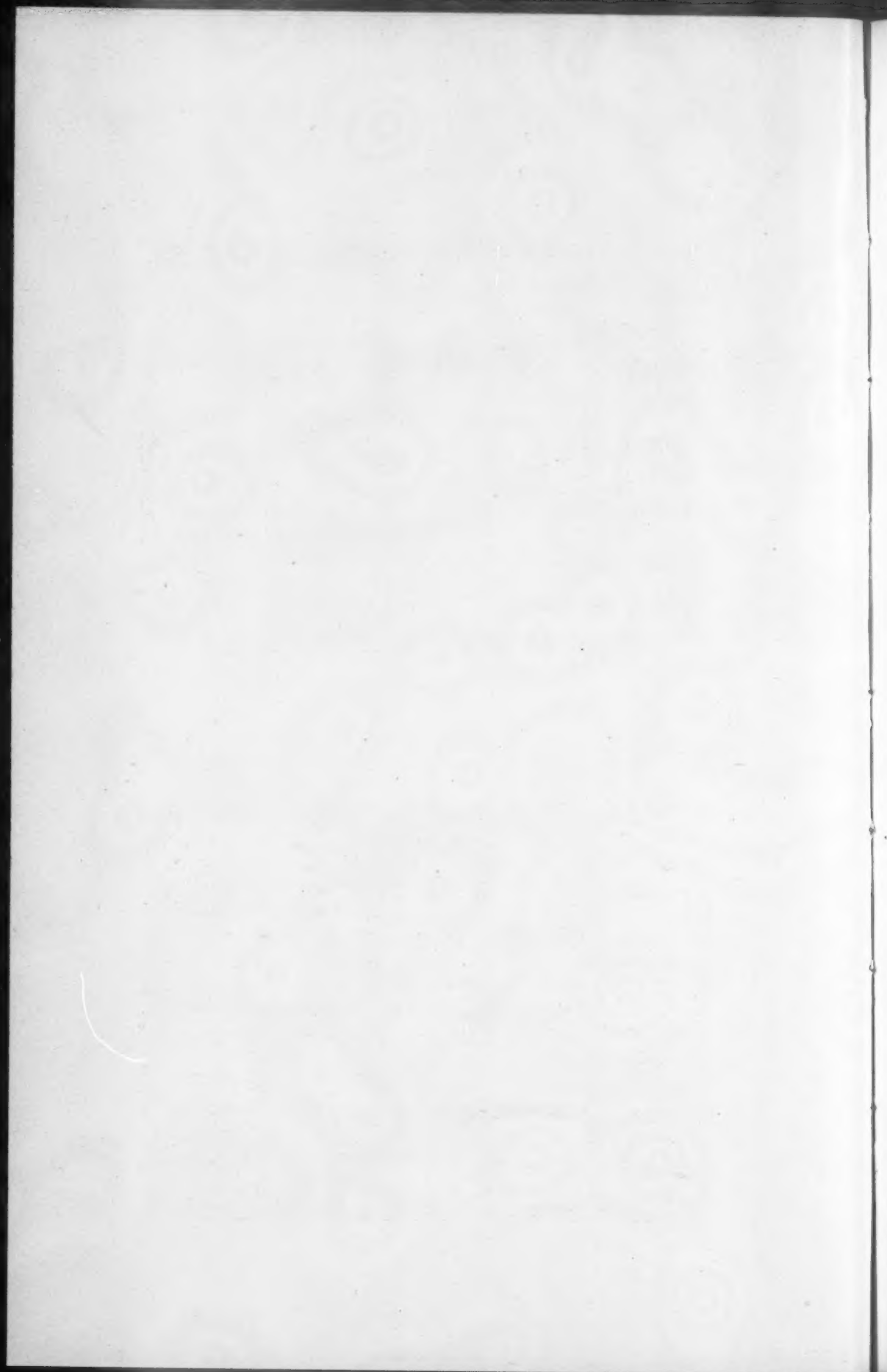


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SURFACE, IMBEDDED, AND MATRIX MOSAIC GLASS.



G. A. Eisen, *del.*



those of the Boscoreale silver treasure and the contemporaneous Arretine (Cf. Pl. IX, fig. 12), Samian, and green-glazed pottery which undoubtedly inspired the makers. The handles, if upright, were broad and thin; if horizontal, they extended in the plane of the bowl and were even with the top. The decoration consisted of "guttae" or drops, horizontal threads, rosettes, beads, and depressed lotus petals along the base or on the lip. Sidonian glass kept its perfection to the end of the century. Beakers with cut ornaments or with drop bosses have been found in Pompeii. Diatreta vessels (See below) and cut glass began to appear and were produced with perfect technique. That some of the finest specimens of this technique known belong to the first century can be proved by the form of the vessels. The study of this period must be based primarily upon objects found in Pompeii and other cities buried in the first century. Many objects, such as beakers and flasks decorated with vines and animals and formerly ascribed to the second or even third centuries, belong to the time of Pompeii.

Second century A. D. With the reign of Hadrian a reversion to Greek forms is noticeable. Hadrian travelled continually during many years and procured and sent to Rome everything that pleased his fancy. His travels in Greece caused a revival in the taste for Greek art, and consequently Greek forms were given to glass objects. The only mosaic known to have been applied to vessels consisted of surface "guttae" or drops (Pl. XI, 6) and was generally associated with Greek forms. The new decorations, both on vessels and beads, consisted in twisted or wavy threads and rods, applied around the lip, along the handles, or down the sides of the vessels. Serpent threads were used in profusion, often in combinations far from pleasing. Reliefs were produced by means of moulds. The Church Father, Tertullian, severely criticises the use of the figure of the Good Shepherd on Christian chalices.

Third century, A. D. The use of serpent figures continued, but they were now more sober and less

complicated. Diatreta vessels of glass or of glass and silver were highly prized, but executed with a less perfect technique. The flat cups and bowls without handles which, in the first century, were wide and shallow, were now made narrower and deeper. Cut glass and cut decorations were common. Cylindrical vessels were the most fashionable, but spherical and funnel-shaped forms were also common. The necks of the flasks were either cylindrical or funnel-shaped; bell-shaped bowls were in favor. Large, multiple and elbow handles which projected far from the body of the vessels show the extravagance in taste. The decoration consisted of spirally wound and horizontally applied threads and rods of glass. Beads were decorated with "overlaid technique," the vessels were covered with "fins" and drops. Accessory handles between neck and girdle were among the curiosities of the period. The colors of the handles and threads were often different from that of the body of the vessel, which was generally a blue-green. Many flasks were decorated by depressed cavities, lines, and circles. This period is considered by many the most perfect, but, as some of the specimens upon which such a theory has been based belong to the first and second centuries, the preference must be given to these.

Fourth century, A. D. The Christian or Constantinian period. Several distinct types of vessels were produced during this century, the most characteristic being the Syrian and Jewish glass, which are characterized by being many-sided, each side furnished with a figure decoration in relief or in depressed patterns. The prevailing decoration consisted of the "wave," which is a zigzagged thread or rod, applied either on the girdle of the vessel or on the beads; but the most characteristic use of this ornament was to stretch it from the neck of the vessel to the girdle of the bowl or to its shoulder, thus leaving a hollow space underneath around the neck. Serpent threads and waves are often combined. Most of the known glass from this century comes from Syrian tombs and was undoubtedly made in that country for the use of the pilgrims to the holy places. Amulets, religious tokens, symbols, emblems

of Jewish as well as Christian nature constitute the characteristic features of this glass. Among general types we have goblets with heavy low foot-disks and tumblers without stands. These are often made with concave sides.

Fifth and Sixth centuries, A. D. Our principal knowledge of these centuries is derived from the Castel Trosino and Nocera Umbra collections in the National Museum in Rome. They show us that the types were few and simple, practical and well-balanced on wide foot-disks. The most conspicuous decorations consist of "dragged" patterns in red and white on yellowish and blue matrix as a background. Kisa considers the finest specimens to have been heirlooms from the fourth century, but such a theory is unwarranted, because the fifth and sixth century beads are characterized by such "dragged" patterns in the same colors, and it is entirely proper to assume that the vessels thus decorated were made at the time of the beads. There were many new colors in this period, such as deep orange, lemon-yellow, brick-red, opaque emerald, and olive-green, used in combinations giving a distinct character to the wares. Without a knowledge of the glass of these two centuries the glass of the Arabic period could neither be separated nor explained.

Arabic Period

When the Arabs conquered Egypt in the seventh century their first work seems to have been the robbing of tombs and the search for treasure. In these tombs they found innumerable treasures of gold, silver, and glass. The metallic objects soon reached the smelting pot, but the glass objects served in time as models for glass of their own making. It is thus possible to divide the Arabic period into two epochs. The first includes the time when antique glass was imitated. In the later epoch the Arabs were able to invent forms and decorations themselves. They at first made alabastrons in the style of the ancient Egyptians, imitating the old ones so perfectly as to make them distinguish-

able only by their colors. The earliest Arabic glass seems to have been tube-blown, just like the Ptolomaic glass, the decoration consisting of "dragged" patterns like those on the old Egyptian flasks. All other types made at that time are heavy, with thick walls, small in size and poorly executed, and on this account most of these flasks have been identified by students as early Roman or Greek wares. The favorite decoration of the first epoch represented snakes, hides, and shields, objects which the Arabs valued, but which the Egyptians and Romans had scorned as unsuitable for decoration.

With the twelfth and thirteenth centuries the Arabic glass became refined and elegant in form, and the older decorations gave place to figures of animals, elegant vines, trees, flowers, and the like. From this period we possess some of the most beautiful specimens of glass ever made, decorated in enamels of blue, green, and gold. To this period belong the fifteenth century so-called Alhambra Vases, somewhat Greek in form, but with upright, flat and broad handles, never found in any other types. Besides the large vases of this kind, we possess numerous small flasks of the same general form decorated with "dragged" patterns, like the old Egyptian vases, but containing much brick-red and white. The matrix is often dull blue-black, peculiarly displeasing to an eye accustomed to the refined Egyptian work of corresponding type. Nearly all this ware has been incorrectly classified as Roman. Yet, strange to say, the Arabs to this day produce objects of glass which are carried home by tourists and which may be found in our museums variously labeled Egyptian, Etruscan, Greek, and Roman.

Of course, not all the glass in this period was made by the Arabs. Much was made by the Christians, and even the Jewish glass seems to have continued in favour. Much of the gray oxidized glass hitherto ascribed to the fourth century, probably belongs to this period.

Venetian Glass-workers

During, and partly as a result of, the Arabic conquest, the centre of the glass-making was transferred from Egypt to Venice. The Venetians soon began to fill the wants which the Arabs were incapable of supplying, and it is presumed that they had achieved a reputation long before the time of Marco Polo. The date of the earliest Venetian glass is not determined. Some have suggested the sixth or seventh centuries, but it seems improbable that this glass was made to any considerable extent before the tenth century. In the end of the thirteenth century the great traveller, Marco Polo, returned to Venice after an absence of many years. He had discerned the taste of the Orientals and suggested to his countrymen that they apply themselves to the making of beads, which could serve as a ready material for exchange.

The suggestion must have been adopted at once; some twenty years later we find the Venetians supplying the Orient with their glassware. But the real magnitude of Venetian glass industry culminated only after the discovery of America by Columbus, when it became apparent that the Natives of the New World were as readily brought to terms by a handful of glass beads as had been the Orientals before them. In late years much of the bead trade has been acquired by the Germans on account of the cheapness of their ware, and by the Bohemians because of their perfect imitation of onyx and other stones.

In the fourteenth and fifteenth centuries the Venetians became greater experts in glass-making than the Egyptians and Romans had been. These artisans produced during their best period glorious specimens, remarkable for lightness and transparency, but displeasing on account of their often very fantastic shapes, which lacked seriousness, force, stability, and pose. The Venetians acquired their technique partly through inheritance, partly through the discovery of new or improved methods. It was by these means that they obtained a reputation as great artists. But they never

succeeded in producing anything so beautiful or so perfect as antique stratified glass, antique mosaic glass, Sidonian first century flasks, or the finer specimens of "diatrete" vessels. Their finest and most perfect work is their ribbon and thread glass made of rods containing twisted bands and threads of a distinct color and pattern. None of their work, nor that of the Bohemians, possesses the charm of the antique glass, which yet remains unrivalled. It has generally been presumed that the Venetians rediscovered the way of producing columnar mosaic or millefiore glass. This, although asserted by Minutoli and by almost every successive writer, is certainly an error, because the columnar mosaic glass technique has never been lost. We possess specimens datable to every century from the time of Augustus to the present day.

Summary of Inventions Relating to Glaze and Glass

Period of Glaze

Glaze for coating objects of stone and paste.

Period of Core-spun Glass

Invention of glass about 1500 B. C.

The core-spun technique.

Dragged threads and bands, producing dragged patterns.

Stripes by means of parallel rods.

Eye-spots and rings by layers of drops.

White transparent glass.

Onyx, carnelian, and marbled glasses.

Creasing the surface by dragging and moulding.

Period of Tube-blown Glass

Stratified glass.

Gold glass.

The dipped rod.

Eye-spots made of sections of dipped rods.

Tube-blown glass.

Blowing out a tube in a mould.

Period of Columnar Mosaic Rod Glass.

The composite columnar rod.

Columnar mosaic glass by means of rods and a mould.

Diminishing the patterns as well as the rods by drawing.

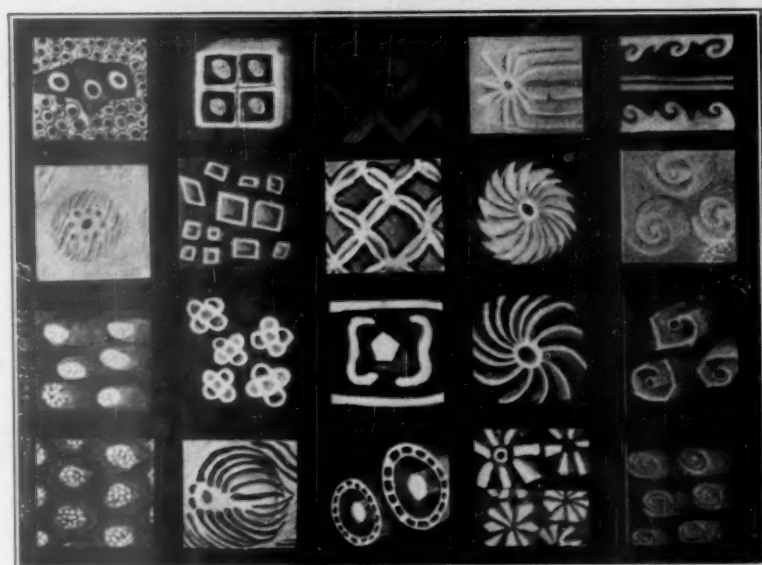
First bubble-blown glass.

Vessels blown in a mould. Sidonian glass.

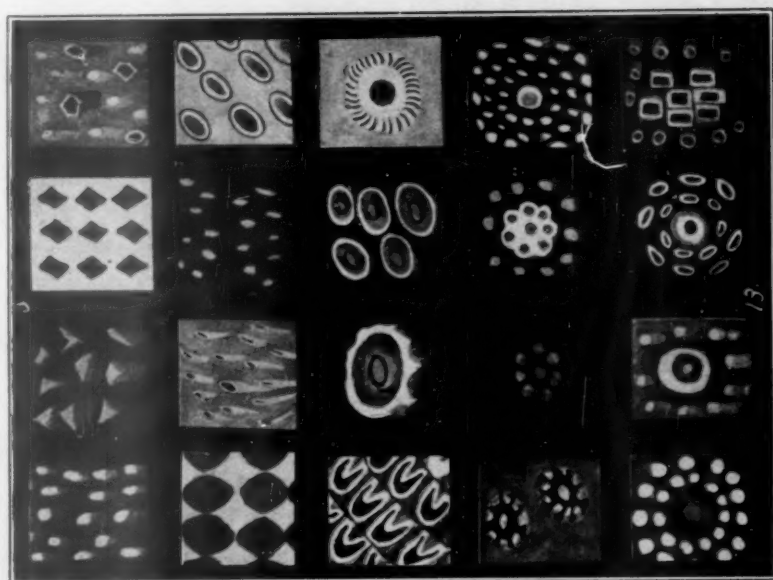
Moulding crystal forms.

Period of Bubble-blown Glass

PLATE XII.



G. A. Eisen, del.



G. A. Eisen, del.

COLUMNAR MOSAIC GLASS.



Large vessels made by bubble-blowing.
 Moulded and cut glass in imitation of crystals.
 Cut, ground, diatreta and opus interrasile glass.
 Pressed ornaments.
 Predominance of white transparent glass.
 Beginning, and steady continuance of degeneration of form, quality, and color. Introduction of new and bright colors.
 A continued tendency to practical and stable forms.

Arabic Period

Imitations of antique forms.
 Imitations of antique techniques.
 Imitations of Byzantine types and technique.
 Original types.
 Introduction of new colors.
 The general use of enamels for decoration.

The Venetians

Continuation of the antique technique, except stratified glass.
 Perfecting all types of technique.
 Star-head glass.
 Extravagant forms.
 Disappearance of harmonious coloring.

CHARACTERIZATIONS AND DEFINITIONS

Glaze is the outer glossy layer on pottery. It is derived from a mixture of earths and other ingredients and is generally applied when cold and fluid, but hardens with heat. When oxidized it may become iridescent. It often possesses a lustre due to the use of metallic salts in its composition.

Paste, terracotta, china, pottery, majolica, porcelain, etc., are mixtures of earths and minerals ground finely and mixed with water to make them plastic. They are formed into vessels, beads, and other objects when cold and moist and in this respect differ from glass. Some pastes are also known as "slips."

Glass consists of earths and alkalies, as well as metallic oxides, which are fused and made plastic by heat. The plasticity of glass commences at about 400 C. and at about 500 C. it becomes liquid. Some kinds of opaque glasses are incorrectly termed "pastes," or "glass-pastes," such as the Sidonian "ivory glass," which is a real glass and not a paste. Before the 18th dynasty, all Egyptian beads and similar objects were made of paste, but with that dynasty, they were also made of true glass.

The *iridescence* is either intentional or due to accident. The intentional iridescence is extremely rare in antiquities. It consists of a very thin film of transparent glass laid over an opaque, black surface. The accidental iridescence is due to oxidation and deterioration, caused by burial in moist earth. Through the influence of the moisture and the air, the glass, as well as the glaze, has separated into layers which refract the light-rays in such a manner as to produce interference of colors, like those on the rainbow.

Lustre is not produced by oxidation but by intentionally added metallic salts. The technique of lustre was unknown in antiquity.

Oxidation of glass and glaze is of importance because different kinds of matrices produced distinct types of oxidation and iridescence. A study of this defoliation of the matrix often makes it possible to determine the nature of the objects, when and where made, where and how buried, and so forth. Some kinds of glass, when oxidized, produced iridescence under certain circumstances. A dry burial of glass produced dull oxidation or none at all. It never produced iridescence, except in cases of fire, as, for instance, when buildings were destroyed. The gray and dull oxidation of Arabic glass of the early period permits us to determine that much glass of this color, hitherto considered as early Christian, really belongs to the Arabic period. Pure white, transparent glass oxidized more readily than opaque glass. In order to preserve the oxidation which is often considered the most important artistic and commercial property of antique glass and glazed objects, the specimens should never be wiped with a moist cloth, but preferably with a brush like that used by photographers for their negatives.

Preserving the Glass and Enhancing its Colors. Glass with undesirable oxidation may be restored to much of its original beauty by brushing the surface with a cold solution of beeswax (not paraffin) in petroleum, turpentine, or any similar solvent which will readily evaporate. The wax soon hardens and preserves the glass from the influence of air. However, delicate and beautiful iridescent glass should not be treated in any manner nor should it be touched by anything but the very softest brush, as above described. Some varieties of glass have oxidized more characteristically than others, and one may often judge of the original color even when that color is lost.

Plain Glass. The matrix is uniform throughout, opaque, translucent, transparent, white or uncolored. The earliest glass, of the 18th dynasty, was milky and soft on account of numerous bubbles. These were gradually eliminated and in the 9th century pure white glass as brilliant as crystal begins to be common. The opaque glass is often referred to as "paste." This term is more properly applied to compositions of clay and earths which were moulded cold and softened with water. Glass was always moulded while hot and could only be softened by heat. The great heat required makes it improbable that the art of producing glass was discovered by Phoenician sailors as the result of an open fire made on the sandy beach at the mouth of a river.

Surface Threads and Bands. Any matrix, plain or complicated, could be decorated with threads, rods, and bands of glass when plastic. In the earliest types such decorations were not rolled into the surface of the glass, but were left more or less elevated. When they are deeply rolled into the matrix, the result is properly termed mosaic glass. The manner in which the threads were applied is often characteristic of a certain period, and all peculiarities of such threads should be noted.

Mosaic Glass. In mosaic glass variously colored units enter for decorative effect. Such units may consist of threads, bands, rods, drops,

and fragments of glass—or even foreign substances, such as metals, sand, etc. Sometimes these elements are imbedded near the surface, but at other times they constitute an integral part of the matrix.

Core-spun Glass. This is the earliest type of glass, invented in the 18th dynasty, but continued long after the conquest of Egypt by the Romans. The first part of the process consisted in shaping a core of clay and winding threads of variously colored glass around it. The threads were then fused by heat and rolled together. (The decoration was made up almost exclusively of "dragged" threads.) The last step in the process was to scrape out the core, which was always softer than the glass.

Tube-blown Glass. In making vessels by blowing a tube or cylinder of sheet-glass was rolled up and closed at one end; then by blowing through a pipe of metal or glass in the open end, the more distant part of the tube was enlarged. The process was invented in the third century, B. C.

Pressed in a Mould. The thick sheet of glass was pressed into a mould while plastic. Only shallow cups and flat objects were made in this way. The method was apparently invented in early Ptolemaic times.

Blown in a Mould. This process succeeded the tube-blown glass but preceded the bubble-blown glass. It consisted in blowing a bubble of glass against fragments of mosaic or other units set along the walls of a mould. It was common in the first century B. C. But the most perfect bubble-moulded glass is the Sidonian ware of the first century A. D. It is fine in quality, fine in decoration, and in every way perfect.

Bubble-blown Glass. The process was invented in the middle of the first century B. C. At first the method was crude but it attained perfection in the middle of the first century A. D., particularly in Sidon.

Stratified Glass. Sheets of glass of different colors were superposed in regular layers, fused together by heat, and when cold cut in thin strips. Of these strips tubes were made in different ways, by folding, by twisting, or winding around a core. Vessels were made of these tubes as already described. The pattern of decoration was formed by the edges of the layers. This glass was invented in the time of the Ptolemies.

Rod Glass. Rods of glass were placed side by side along the walls of a mould and fused. The invention is Egyptian in origin but was made in early Roman imperial times.

Cameo Glass. This is a kind of stratified glass but its employment was quite distinct. The glass, imitating carnelian and other hard stones, as well as the cameo-shell, consisted of two superposed layers, the upper one of which was carved into figures, the parts between the figures being scraped away in order to show the lower layer as a background.

Vasa Diatreta and Opus Interrasile. These vessels were made of two kinds of glass, just as was the glass cameo, but the outer layer has the form of a perforated decoration *à jour*; it is also known as openwork. The finest specimens date from the first century A. D. The technique of the type is disputed, but I imagine that the process

was as follows. The outer, open and perforated layer, was made in a deeply carved mould. Against this openwork was blown a bubble of different glass. When removed from the mould, and when cold, the outer layer was scraped, ground, cut, and polished, short pieces of glass being left to connect the two layers. It is one of the most beautiful of the antique techniques.

Enameled Glass. This was known to the Romans, who used it not only for decoration but for making larger objects, such as busts. A bust of Caracalla (?) in the Conservatori in Rome, is said to have been made by superposing enamels. The enameled process was extensively used and preferred by the Byzantines and after them by the Arabs.

Turned Glass. Many vessels, especially those of rather flat form, show that they have been turned on a kind of potter's wheel. The process was employed in diminishing the thickness of certain milleflore and Sidonian so-called ivory-glass vessels. These, as has been mentioned, were produced by blowing or pressing a thick bubble of glass against rods and plate units in a mould. This bubble as well as the superfluous thickness of the rod glass was afterwards ground off. Many such vessels show the rings caused by turning. I do not think any glass vessels were formed entirely by turning; the same effect could have been produced by first moulding the vessels and then finishing them by turning.

Handles. The technique and form as well as relative size of the handles are of great importance, because they varied with the period. Thus, in the earliest Egyptian alabastrons the handle consisted merely of a knob. In Greek times the knob was changed to a tiny handle. At a later period the handle was made larger. The quality of the surface of the handles is of importance in dating, because the handles with a smooth surface are much earlier than those strongly striated. The handles of the late Arabic alabastrons (seventh and eighth centuries A. D.) were striated or even ribbed. The handles in the time of Augustus were made wide and thin, like strips of paper. In the third and fourth centuries A. D. the handles were often zigzagged, like the teeth of a cog-wheel.

Lip. This varies considerably in type, from narrow to broad, from flat to funnel-shaped, from even in outline to pinched and trifoliate, from horizontal to upright or sloping downwards.

Surface. On the flasks as well as on the beads the surface was either naturally smooth or was made smooth by grinding. It was sometimes ground or "cut" into forms of decoration, and it was fluted or ribbed, either by creasing or by adding ribs, waves, shields, spiral threads, drops, bosses, etc.

TECHNICAL PROCESSES CONNECTED WITH BEAD-MAKING

Beads which look alike to the unpracticed eye differ materially in method of manufacture. Since the processes varied and were improved from time to time, and new and more practical inventions made, a knowledge of them becomes a necessity in classifying the objects. The technical processes concern the formation of the bead, the for-

mation of the bore, the decoration of the bead, and its finishing. By studying this subject with attention to details, it is nearly always possible to determine the date of the bead, and in some instances its provenance. A few illustrations make these facts comprehensible, as, for example, the capped beads of the 18th dynasty and the capped beads of the 2d century, A. D., which differ essentially in the manner in which they were made. The former consist of a solid unit of glass, the latter of a flat piece of rolled glass, thus producing a suture which is always recognizable.

The spherical and other beads of the time of Amenhotep which were decorated with a spiral thread, may be recognized by the manner in which this thread was commenced and by the way it was applied to the surface. Some beads, before the time of Augustus, were made, preferably, by laying a glass thread over a wire. Such beads show a short nib or projection at each end. In some beads the bore is wider at one end than at the other, the rod used having been wider at one end. The creases in melon-shaped beads were either made by hand or by rolling over a grate. By the latter method the creases often overlap at the commencement and at the end. In producing the wave, the thread was either run along in a wavy fashion without a break, or halted at the points to form a small loop or a thick dot.

Some eye-spots were made of superposed drops of glass, others were made by separate rings of glass, others again from slices of a rod with inner concentric layers.

How very little attention has been paid to these details even by those who have written upon the subject is shown by the fact that glass vessels and glass beads are often dismissed with the single word "variegated," which conveys no other meaning than that the objects were parti-colored. It is perfectly evident that no scientific value can be attached to such descriptions, which is all the more regrettable, since many of these specimens are now either lost or inaccessible.

Technique of the Matrix

Spiral Rod. A thread, band, or rod was spirally wound over a metal stylus, wire, or rod. The beads produced in this way show the ends of the thread projecting at each bore.

Perforated Unit. A small lump of glass was taken up and formed against a marble plate and finally a rod was passed through to form the bore.

Cut-off Cylinder. A perforated cylinder was first produced, then cut in slices either while soft or when hard. The ends were rounded or left square and flat.

Punched Out. The bead was punched out from a flat sheet of glass while it was soft.

Rolled-up Sheet. A small sheet of glass was rolled up longitudinally, the junction of the two edges showing as a suture.

Bent and Twisted Strip. A strip of glass, generally cut from a sheet already ornamented, was bent, or bent and twisted. In the former case but one suture was made; in the latter a suture for each bend and edge.

Parallel Rods. Four rods of glass of equal size were placed side by side longitudinally in a square, so that the sides joined. After fusing, the rods were cut in lengths and ground off to form cylinders and spheres. The inner rings of the dipped rods then showed on the surface as decorative lines.

Fused Rods. A solid rod was cut in lengths and formed into cylindrical or rounded beads. The bore was made transversely to the rod in order to show the core of the rod at the opposite ends intact.

Moulded. The bead was cast in a mould. The joints of the mould show.

The Bore and the Cavity

The bore in a glass vessel or in a glass bead offers characteristics which help to date the object. The following ones are the most important.

Scraping out the Core. The core in the core-wound flasks made of clay, was scraped away when the flask was ready.

Bore made by Punching. This was used in Egyptian disk-beads of paste and glass. A rod was used in forming the bore of the glass beads or of the hollow flasks by forcing it through a lump of soft glass. Such bores are often wider at one end than at the other, as presumably the rod was thicker at the base.

Laying over a Wire. The bore was formed by rolling or laying a glass thread over a wire or rod. Such beads or vessels show a spiral twist. Thus were formed many beads from the Egyptian New Empire to the time of the Ptolemies. The bore of many stratified glass flasks was also made in the same manner, which can be readily recognized by observing the spiral course of the thread or strip.

By a cylinder. The core of beads and of flasks was also made by first constructing a cylinder. If the opening was desired wider than the bore of the cylinder, it was enlarged by blowing out the cylinder, after one end had been closed. If it was desired narrower, the cylinder was drawn. The bore diminished with the cylinder without closing up.

By Folding. A piece of sheet glass was rolled or folded so that the ends met. All such bores or tubes show a trace of the suture where the edges meet. In beads such sutures were generally widened in time by the thread on which the bead was strung. This fact constitutes a ready means of separating the capped beads of the 18th dynasty from those of the 2d century A. D.

By Blowing a Bubble. The bubble-blown glass seems to have been invented in the first century B. C. but many of the vessels hitherto believed to have been produced that way, can be shown to have been tube-blown—for instance, all vessels made of stratified glass, all long narrow vessels with heavy walls, nearly all flasks termed by dealers "candlesticks," and many other specimens of the first century B. C., as well as of the early Arabic period.

By Drilling. The cavities and bores made in hard stone were produced by drilling with a metal instrument and corundum and emery powder. The antique drill bores are characterized by having been

drilled from two opposite sides, the two bores rarely meeting exactly. Many glass objects are also drilled in the same manner.

Technique of the Decoration

Wave. The wave consists of a zigzag thread carried along a surface. It was made either by running the thread up and down and forward without a break, or else the artist halted the thread at the top of the crests and at the base of the hollows, twisting the thread backward at the same time, thus forming a loop or a thickened dot. The former process produced round waves; the latter, pointed waves. The waves could also be produced by "dragging" in one or two directions. Another way to produce the wave was to use flat plates of glass in the manner of columnar mosaic glass, like the star-bead glass, or by rolling the surface over a grating, and then dipping the object in fused glass of a different color.

Granulation. The spots and granules of the surface were made with fragments of glass, with cut-off mosaic disks, or with drops.

Creasing by hand. Beads with parallel creases, like melon beads, show elevated ribs from pole to pole. The creases were made by pressing the bead with the edge of a tool.

Creasing by rolling. The soft and rounded bead was rolled over a creased surface with parallel ridges. These creases did not reach the poles of the bead, and often overlapped along the ridges.

Creasing by drawing or raking. Creases separated by wide ridges were made by drawing the surface with a hard sharp point of metal. This method was generally used in producing dragged patterns.

Creasing in a mould. The creases were produced in a creased mould. The two or more joints of the mould show.

Creasing cylinders. The whole cylinder was first creased and then cut in slices. Such beads show the creases up to the flat bore-ends, sometimes, even if the ends have been rounded off.

Pitting. Impressions were made in the bead by a hard point of metal. Creased ridges were sometimes pitted.

Knobs. Knobs of glass were often added to the surface, especially in the fifth and fourth centuries B. C. After an intermission the fashion was revived in the 5th to 8th centuries A. D.

Eye-spots. The technique of the eye-spots is of the greatest importance in the study of antique glass, as it assists in dating such glass with accuracy. The following methods were in use.

Impressed Rings. A small ring of glass was pressed into the surface of the glass. The Venetians sometimes used twisted threads of glass in the rings. Drops of glass were rolled into the surface of a vessel or bead and on the disk thus procured a smaller drop was placed and rolled in. The first drop then appeared as a ring, the second drop as a central disk.

Cut-off Rod. The eye was produced by cutting sections of a rod made of concentric layers. The latter formed the rings.

The impressed rings date from the first efforts of the Phoenicians to make glass objects. The stratified eyes date from the 19th dynasty, before which time the eye-spots were simple and made from a drop of

glass rolled into the surface. The cut-off rods came into use during Ptolemaic times.

These methods not only permit us to date a bead or a glass vessel, but often enable us to detect intrusions.

INTRUSIONS

Intrusions are objects which appear in connection with objects of a different date, either in the tomb, in the excavation, or in the collection: as, for instance, modern beads in an antique necklace. Such intrusions are common, and so far I have never discovered a single collection of antique glass—vessels or beads—which did not possess one or many such intrusions. The intrusions are of two kinds, old and recent.

Old Intrusions. These consist of older objects intruded among modern ones. For example, in old tombs or excavations we discover objects more ancient than the tomb. These objects were either heirlooms or derived from old tomb-robberies. They were the property of the deceased or his friends. Several necklaces of glass beads in the Castel Trosino and Nocera Umbra collections in the National Museum of Rome, contain one or more older beads. Some of these belong to the fifth century B. C.; others are from the time of Augustus. Some, again, date from but one or two hundred years before the tomb. However, the glass vessels found in these tombs, which Kisa considers as heirlooms of the fourth century, are of the same date as the tombs which belong to the sixth century A. D.

Recent Intrusions. These consist of objects of later date, generally modern specimens, which have been, purposely, by accident, or by ignorance, coupled with the more ancient objects. I have noted numerous such intrusions. For instance, a necklace of Modern Arabic beads in the Vatican Museum is labeled "Pharaonic, 18th dynasty." A vase of Venetian star-bead glass in the same Museum is labeled "Roman mosaic glass." A necklace of modern Venetian beads is shown in a collection of objects labeled, "First iron age," in the Museum of Berne. A Venetian necklace of oblong beads with "dragged" decoration, is exhibited in the University of Perugia Museum as "found in a Greek vase of the third century B. C." A modern Venetian necklace is exhibited in the Antiquarium of Munich in a case with Egyptian dynastic beads, and in the same collection a necklace of modern Sudanese beads is said to have come from a dynastic tomb. In the Etruscan Museum of Rome, in Villa Giulia, two central beads in a fifth century B. C. necklace are modern, one possessing an eye made of a twisted thread ring. In looking up the record of the necklace, Dr. Giglioli found that, contrary to supposition, the necklace had been purchased and not excavated. Finally, I must call attention to the fact that star-beads, all of which are Venetian, are common in necklaces that come to us from Egypt, Syria, and even Italy. The star-beads seem to have been the most appreciated type of beads of the Venetian factories of the fourteenth and fifteenth centuries. Such beads come principally from Arabic tombs.

SPECIAL REFERENCES

Gold Glass and Gold Glass Cups

Gold glass contains a thin gold leaf between two layers of transparent white glass. The effect produced by such glass is superior to that of solid gold. The glass sparkles, but is at the same time soft, and does not refract the rays of light in the same glaring manner as does a surface of gold. This is especially apparent in gold glass beads, the edges of which are soft and subdued, while the edges of pure gold beads are sharply defined and harsh. The glass was probably prepared in two different ways, according to the use for which it was intended. If intended for vessels, the gold leaf was spread over a flat surface of glass and made to adhere to it by some thin adhesive matter like gum, albumen, honey, etc. When dry, another thin sheet of transparent glass was placed on top and the two sheets fused together. If intended for beads, the process was necessarily different and was probably as follows: A thin tube of glass was covered with gold leaf. It was then inserted into a slightly larger tube of glass, and the two tubes were then fused. Instead of gold, silver and other metal-leaf were used, and silver glass is even more common than gold glass. Such glass did not lend itself well to being drawn, or extended by blowing, as the gold leaf, which would not stretch at the same rate as the glass, would crack in every direction. Such cracks are actually seen in all specimens of gold glass vessels, but are less apparent in beads, which required to be only slightly extended and modified in form and size. A defective quality of this glass is shown by the fact that it was apt to separate into its component parts. Beads, especially, suffered in this manner, and many specimens show large chips at the ends, exposing the middle layer of gold. To prevent this tendency a small cap of plain glass was generally placed at each end of the bead. This cap closed the opening between the two glass layers and held them together. Gold glass seems to have been invented in the time of the Ptolemies, the earliest specimens dating from the third century B. C. It continued in use during the empire, but its quality degenerated from the time of Augustus, and the mediaeval objects which have been preserved give no idea of the beauty of the older ones. It was used both for vessels and for beads. The most glaring defect in the late empire glass was that the layers separated from the gold and heavy and unsightly caps had to be placed on the beads in order to prevent them from falling into fragments.

The fame of the gold glass is due partly to its use in mosaic glass from the third century B. C. to the second century A. D.

Greater interest is now attached to the cups made of this glass which have been found in the catacombs. The interest is due to the gold glass graffiti in the bottoms of the cups. These figures were produced by scratching the gold leaf with a needle, thus forming non-metallic lines in the gold surface. Some of the scenes are pagan, but the majority are decidedly Christian, representing Christ, apostles, and saints. Some scenes are, however, strictly Jewish, showing the

ark, the seven-branched candlestick, palms, Jewish vessels and other objects from the Temple. One of the most interesting depicts a Greek temple, in the tympanum of which is a seven-armed candlestick. An inscription confirms the supposition that this was intended to represent the Great Temple of Herod, which possessed a Greek form. But it cannot be assumed that this illustration was based upon anything except tradition, and it adds but little, if any, to our knowledge of the appearance of the Temple, although it confirms the idea that the central structure was Greek in style. Generally, only the bottoms of the cups remain, as they are the only parts which contained graffiti. Most of them were found in the cement which sealed the "loculi" or tombs of the Christians, and theories have been advanced to explain why they were placed there and why they were always broken. I venture to suggest that the scenes of Christ and saints were regarded as protective amulets to the defunct, and that the cups were placed in the cement in such a manner as to be readily seen from the passages in the catacombs. They indicated to the living that the deceased was a Christian, and served as a warning to the evil spirits and influences, which were supposed to haunt these dark places, that the dead should not be disturbed because he rested in Christ. The saints represented were probably the patron saints of the deceased, and it has been observed that when two saints were depicted in the same cup, these two saints had their celebrations on adjoining days. There are no good reasons for assuming that these cups were used as communion chalices, nor that they served as identification marks by which relatives could recognize the graves of the members of their family or those of friends.

Sacred Vessels Reproduced in Glass

Already in the first century it seems that sacred vessels were reproduced in glass, generally in diminished size. In the fourth century such vessels became common. Such sacred vessels were doubtless limited to very few types. So far, I have identified the following: the cup of the Last Supper; the vessel in which Joseph of Arimathaea collected the blood of Christ; the flasks in which Joseph of Arimathaea preserved the blood, and which he carried with him; the wine jars of the Wedding Feast at Cana; storage flasks and wine casks for the Eucharistic wine; and mystic chalices with the wine, vine, and the loaves.

The glass amulets used by the Christians of the fourth century A. D. were numerous. These were sometimes of the same form as some sacred object, sometimes that sacred object was engraved, stamped, or otherwise added on some indifferent object. Besides Christian Jewish and pagan symbols were common.

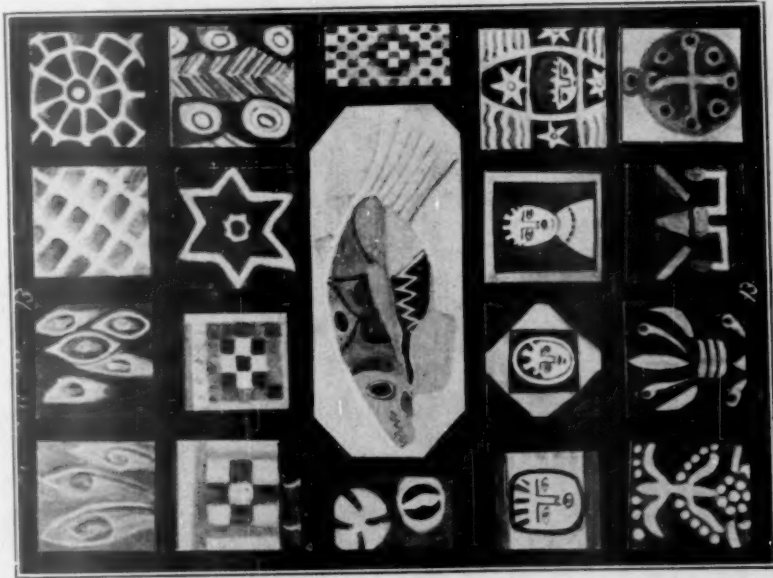
The Units of Columnar Mosaic Glass

The primary units consist of *rods* and *plates*. These rods and plates may be used singly or in combination, and by such combinations a great, or perhaps an infinite, variety of patterns may be produced.

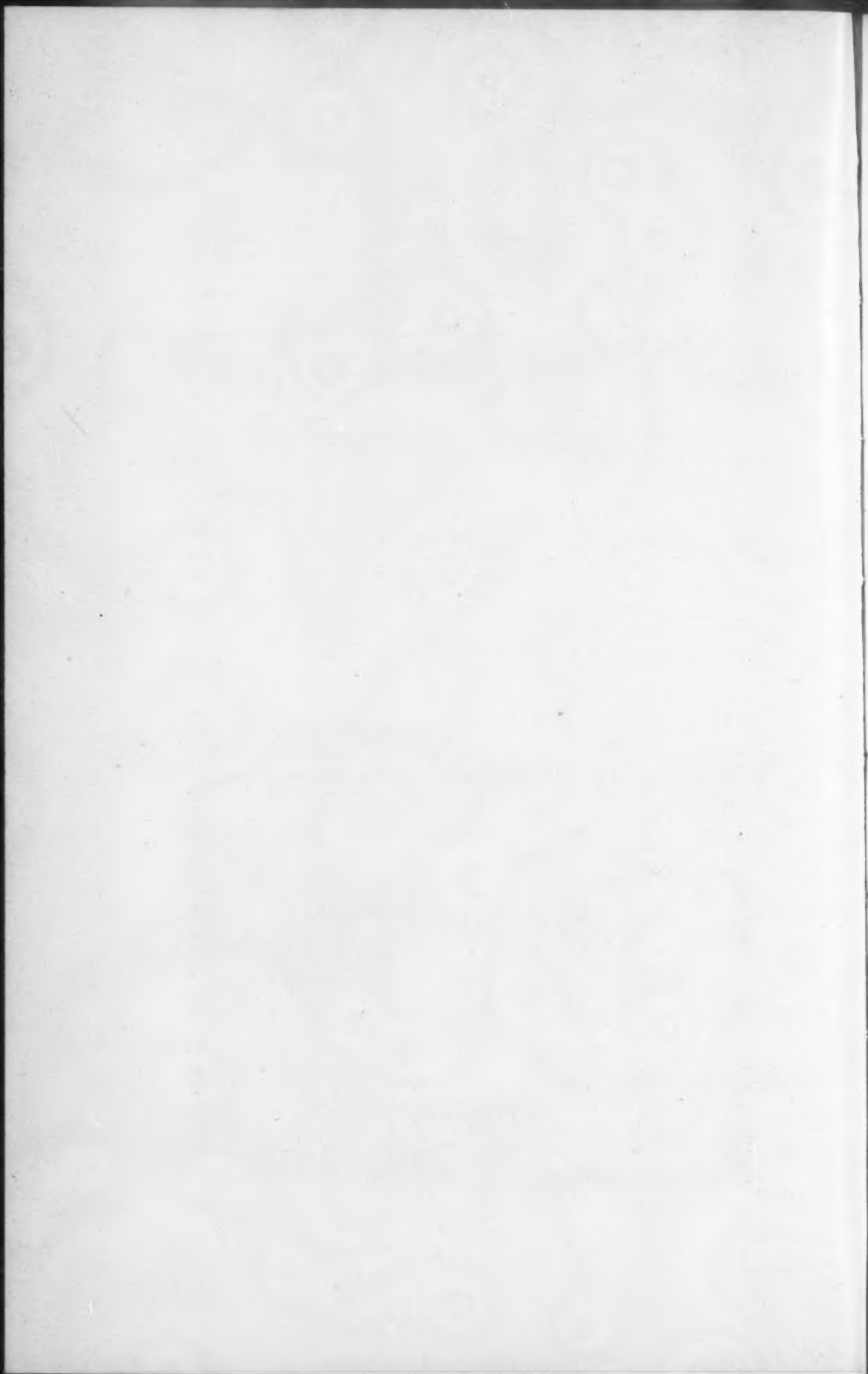


NEW YORK, METROPOLITAN MUSEUM: GOLD GLASS.

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G. A. Eisen, *del.*
COLUMNAR MOSAIC GLASS.



Rods. The rods are either plain or decorated. The plain rods consist of monochrome rods of glass used singly or in combinations. They need no further description. The decorated rods were produced in various ways. *By dipping.* A plain rod was immersed in molten glass of a different color and thus actually coated. *By association.* A plain rod was placed in a mould in an upright position and surrounded by other upright rods of different colors, so placed as to produce a pattern. When these rods were fused and drawn out, a small rod as large as the original plain rod was produced, but the new rod contained in its interior the new pattern. This pattern was made visible either by cutting the rods in disks, or by grinding off the rod longitudinally. In the former process the rings were displayed or a center dot was seen surrounded by other dots, etc. By grinding off the longitudinal surface the central core appeared as a rod lined by two other rods, resembling a triple band, common in mosaic glass. *By rolling a sheet.* The decoration was also produced by rolling a sheet of glass and filling in the space with other rods. Such a rod when cut off horizontally looked like a scroll seen from the end.

Plates. Instead of rods, plates of even thickness were placed in the mould and the spaces between the plates were filled in with rods, of a distinct but uniform color. In this way star, scroll, spiral, cubist, chess-board, honeycomb, etc. patterns were produced.

Combinations of Plates and Rods. The greatest variety of designs could be produced by combining rods with plates. I instance some. *Stars.* A central rod was surrounded by plates. The latter formed the arms or points of the star, the rod was its center. *Volutes or scrolls.* By placing the plates in a circle, or a spiral, rings and scrolls were produced but these can be distinguished from rings and spirals and scrolls formed in a different way, because the plates never joined so accurately that their joints could not be recognized by an open space, a spur, a crease, or a break. Cubist heads, flowers, plants, fishes, insects, ornaments of every kind were produced in this manner, and constitute the glories of mosaic glass patterns. The star-bead glass of the Venetians was produced by such combinations of rods and plates, but in order that the star points might show on the sides of the bead, the latter had to be rounded off at the ends by grinding, or the beads were ground to faces like precious stones. The star-bead is of special interest to American students, as such beads have been found in many tombs in the Western hemisphere since the time of Columbus, all having been brought here by the Spanish or other traders.

Color References

French chemists, among them Berthelot in particular, have analyzed the colors of antique glass and published the results. From their accounts, we learn that the ancients used about the same minerals as do modern glass-makers, but they did not possess as great a variety. Unfortunately, all these researches are useless to the present investigator for various reasons. They do not describe the colors in such a way that we can understand what is meant and they are not able to tell from what locality the glass was obtained. Thus, all the work

must be done over, with material accurately dated and with control specimens deposited in some museum for future reference.

Without alluding to the chemical composition, it can be said that it is often possible to determine a bead or a vase by its color alone. A table of colors in use from the Old Empire in Egypt to the present day might be compiled, but the publication of such a table would offer innumerable difficulties which modern printers are not likely to overcome. Certain colors were scarce at certain periods and from time to time new colors were added. Thus brilliant crimson was not known until the time of the Ptolemies. In the time of the early Roman emperors the following new colors were introduced, perhaps from the distant Orient: opaque emerald green, opaque deep orange, a certain kind of opaque deep lemon. A most interesting study is in observing how the colors gradually disappeared, deteriorated or were replaced by others. Such deterioration and disappearance undoubtedly depended not alone upon taste but also upon changes in trade, in opening up new trade routes and in the closing of others. Keeping these colors in our mind, it is possible to recognize at once whether a necklace or a vessel belongs to Egyptian, Roman, or Mediaeval times.

KEY TO THE CLASSIFICATION OF ANTIQUE DECORATED AND MOSAIC GLASS

(The nomenclature and key are proposed by the author.)

A. SURFACE MOSAICS. Thread and band glass. The ornamental units are confined to the surface of the glass, or pressed into it. Principal types: Pls. X and XI, 1, 2, 3, 4, 5, 6.

Undisturbed Threads and Bands (Pl. X, 1). The units consist of threads and bands, always more or less retained in the same position as when laid on the matrix. Varieties: *a.*—Threads deeply rolled into the surface. *b.*—Threads slightly rolled in. *c.*—Bands deeply rolled in. *d.*—Surface bands. *e.*—Fused bands.

Dragged Threads and Bands (Pl. X, 2). The units consist of bands or threads which have been given a distinct character by the process of dragging. Varieties: *a.*—Waves. *b.*—Zigzags. *c.*—Arcades. *d.*—Garlands. *e.*—Foliate-plumate. *f.*—Semifoliate. *g.*—Scattered foliate. *h.*—Helicoid-foliate.

Overlaid-folded (Pl. X, 3). The units consist of bands or threads which have been disturbed by twisting, folding, or partial elimination. Varieties: *a.*—Single fold. *b.*—Single twist. *c.*—Double fold. *d.*—Double zigzag fold. *e.*—Triple fold. *f.*—Double ear. *g.*—Overlaid herring-bone. *h.*—Diamond or lozenge patterns.

Lamellated Mosaic Glass (Pl. X, 4). The units consist of thin lamellae applied to a matrix, transparent or opaque. Varieties: *a.*—Entire lamellae. *b.*—Fragmentary lamellae. *c.*—Framework patterns. *d.*—Tesselated patterns.

Incrusted Mosaic Glass (Pl. XI, 5). The units consist of fragments of glass rolled into a matrix. They are generally irregular. Varieties: *a.*—Incrusted fragments. *b.*—Incrusted rod sections. *c.*—Bead incrustations. *d.*—Volute-rods. *e.*—Star-bead incrustations.

Gutta or Drop Glass (Pl. XI, 6). The units consist of drops of glass fused onto the matrix, and more or less deeply rolled in. *Varieties*: *a.*—Scattered guttae. *b.*—Confluent guttae. *c.*—Embossed guttae. *d.*—Drawn guttae. *e.*—Hour glass guttae. *f.*—Rod drops.

B. IMBEDDED MOSAICS. The ornamental units are imbedded in a more or less transparent matrix but do not reach the surface of the glass except where this has been accidentally worn or, occasionally, purposely ground off. The units are for the most part, threads, bands, gold leaves, and crystals, and sometimes even rods, but the latter are never intended to stand on end. Principal types: Pl. XI, 7, 8.

Rod Glass (Pl. XI, 7). The matrix is made up of rods, the ornamentation resulting from the greater density of the edges of the rods or from colored rods alternating with transparent and uncolored ones. *Varieties*: *a.*—Simple rod glass. *b.*—Parallel rods. *c.*—Parallel rod-waves. *d.*—Fasciated rods. *e.*—Streamer rods. *f.*—Surface-threaded rods. *g.*—Ground-off rods.

Trina and Lace Glass (Pl. XI, 8). The matrix is made to contain rods, threads, or bands in its interior. The bands etc. are twisted into spirals etc. *Varieties*: *a.*—Single trina. *b.*—Multiple trina. *c.*—Beaded trina. *d.*—Rectangular trina. The name "trina" seems preferable to "lace glass," the latter name being also applied to an entirely different type in which the threads themselves form the matrix.

C. MATRIX MOSAICS. The matrix of the glass is made up of mosaic units which penetrate, more or less, the whole glass from one surface to the other. Generally this glass is intended to be viewed both in transparent and overhead light. Principal types: Pls. XI, XII, and XIII, 9, 10, 11, 12, 13, 14.

Agglomerated Mosaic Glass (Pl. XI, 9). The matrix is made up of fragments of various kinds of glass in the rough, fused into a mass in which the units retain their outline and color. Variety: *a.*—Brecchia glass.

Maculated Mosaic Glass (Pl. XI, 10). The matrix is made up of fragments or sections of bands, etc., all fused to such an extent that the original form has been more or less lost. *Varieties*: *a.*—Plain maculae. *b.*—Maculae of columnar mosaic glass.

Onyx Glass (Pl. XI, 11). The matrix is made up of layers, fragments, or rods in a manner to imitate natural stones, such as onyx, carnelian, chalcedony, agate, alabaster, murrina (fluor-spar?), marble, jasper, etc.

Stratified or Layer Mosaic Glass (Pl. XI, 12). The matrix is made up of sheets of glass standing on end, or perpendicular to the surface. The layers are always more or less parallel to each other even when bent and twisted. As the principal types have been described in *Art and Archaeology*, VI, 1917, No. 2, p. 69, they need not be rehearsed.

Columnar Mosaic Glass (Pls. XII and XIII, 13). This type is also known as millefiori glass. It is generally spoken of as mosaic glass, and dealers and museum men often commit the error of calling it "murrina glass." The columnar rod glass is so called because it is made up of masses of columnar rods, standing on end and packed

side by side in a parallel manner and fused in a mould. The cylinder is afterwards cut into thin slices, and the glass is made of these slices either by placing them over a core of common glass, or along the walls of a mould, after which a bubble of glass is blown against the slices so as to hold them together.

Gold Glass (Pl. XIII, 14). This glass contains a film of gold or other metal, enclosed between layers of transparent glass.

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Gold Glass and Gold Glass Cups. Sacred Vessels Reproduced in Glass. The Units of Columnar Mosaic Glass: Rods, Plates, Combinations of Plates and Rods. Color References.

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REVIEWS

HANDBOOK TOT DE GESCHIEDENIS DER CHRISTELIJKE KUNST.

By DR. F. PIJPER. Large octavo, 257 pp.; 125 illustrations in the text and 55 plates. Martinus Nijhoff, The Hague, 1918. fl. 10.

This is, undoubtedly, the first work of its kind of so comprehensive a character. Immediately the question springs to one's lips "Can a single volume cover so vast a field in an adequate manner?" Obviously it cannot, and herein lies the greatest fault of the book. The critic is puzzled at the daring boldness of the writer. Professor Pijper, within two hundred and fifty pages, endeavors to trace the history of church architecture, sculpture, and painting from the Early Christian period up to the close of the Renaissance. Any one of these three divisions is more than sufficient for a volume of this size, even though it be a handbook.

Let us judge the work, however, by the intentions of the author. We must not forget that a handbook is not written for those already steeped in scholarship, but for those who have not been reached, as yet, by more ponderous tomes. The ultra-scientific works in German, the rather dry encyclopaedic works in English, the profound and specialized writings in French, covering various aspects of the history of art have been to a great extent inaccessible to the average student. The encyclopaedias and general histories of art frighten the lay reader by their tremendous collection of facts. Professor Pijper desires to reach the great mass of art lovers—to meet their needs as a guide, while at the same time he hopes to be of assistance to teachers and lecturers in the history of art, and to theologians.

The work, therefore, has two classes of readers: the students of art and the students of Christian thought. To satisfy these the writer would need both great scholarship and aesthetic feeling. Professor Pijper is, himself a man of very comprehensive learning but his handbook lacks both of the great qualities re-

ferred to which we demand. A history of art, or a guide to such a history, must not be a museum of facts, but an interpreter of facts.

Professor Pijper, in endeavoring to be a guide, is often too much like a guide of the *concièrge* type. The necessarily superficial way in which he is forced—by the size of his work—to describe the great monuments of art is indicated by the profuse repetition of non-descriptive terms and generalizations like the following:

“ . . . rendered in the most beautiful taste ”

“ Giotto's coloring is pleasant ”

“ The medallions of Luca della Robbia enclose splendid figures, and splendid also are . . . ”

“ Fra Angelico's 'Coronation of the Virgin' is a great symphony of celestial sounds ”

Concerning the portrait of Anne of Cleves by Holbein “ It is said that the King himself was so moved by this flattering portrait that he asked the hand of the lady in marriage. ”

The best part of the book is that pertaining to the Early Christian period, which is far more thoroughly treated than any other. It is clear that the author has read the writings of such distinguished authorities as Strzygowski, Wickhoff, and Venturi, but as to disputed questions—the influence of the East vs. the West, and the origin of important monuments, he takes a middle ground. He himself is not able, apparently, to enter into and to understand the fundamental issues of the discussion.

Perhaps it is better that the beginner in the history of Christian art should not be tangled up with conflicting theories; but after so promising a start, with the ground, so far, fairly well covered, even the novice must be disappointed in having to rush through the Middle Ages as he does, jumping from architecture to sculpture and then to painting, like a giant with seven league boots.

Our final criticism of the work is that it ends with the Baroque period. Doubtless a work must have its limits, but if it is to be called “ A Handbook for the

History of Christian Art," we naturally ask, "Did Christian art die with the seventeenth century? Is there no Christian art in our own time?"

The great epochs for Christian art, we admit, were the ages of faith—the Middle Ages. Professor Pijper would have achieved greater success had he limited his book to a "History of Christian Art in the Middle Ages." But, if he includes the Renaissance, which was so largely pagan, we can demand that he satisfy our queries about more modern times.

In architecture the great Gothic revival of the nineteenth century, lasting into our own days, may be a mere reflection of a previous age, but is it not a Renaissance as were the Renaissances of the ninth, thirteenth, and fifteenth centuries? Great churches and cathedrals have been built—great experiments are still being made in our own age. Students of art can therefore demand that these at least be discussed in the light of history.

In painting, are the Pre-Raphaelite and Idealistic movements of the nineteenth century in England to be ignored, on the basis that they are reproductions of a previous era? Rossetti, Burne-Jones, Holman Hunt may have sought nothing more than to revive the spirits of Fra Angelico and Benozzo Gozzoli, but they themselves were painters of Christian themes, and have a place in the history of art.

In France, what about Puvis de Chevannes? Did he have no independent style? Are his panels illustrating the life of Ste. Geneviève to occupy no place in the gallery of Christian art? And one also wonders whether Jules Bastien-Lepage, L'Hermitte, Cazin, and Dagnan-Bouveret did not contribute to the same historic gallery?

In Holland today, Professor Pijper's own country, what about Toorop? In this painter there is certainly a Christian character. Neither modern nor primitive, but perhaps both, he belongs to the great mystics. He should, in some way, be included.

Notwithstanding these disappointments, Professor Pijper's work is not without value. His rather thorough

bibliographies at the end of each chapter, and his indexes at the back of the book, not to mention the numerous illustrations, which are well selected, make the book useful as an introduction to the subject of Christian art. Its chief value should be to theological students who will find in the monuments of art here touched upon much that is illuminating on the subject of the development of Christian thought and worship. Art is too little known, or at least too little utilized by our theologians and religious leaders. Perhaps this is one of the reasons for the lack of religious art today.

ARTHUR EDWIN BYE.

A Handbook of Attic Red-Figured Vases, signed by or attributed to the various masters of the sixth and fifth centuries B. C.
By JOSEPH CLARK HOPPIN. 2 vols. Pp. xxiv, 472 and viii, 600. Illustrated. Harvard University Press, 1919. \$8.00 per volume.

All students of Greek vases have long felt the need of an illustrated Corpus of signed Greek vases, and all students of art will be indebted to Professor Hoppin for producing a work which entailed much correspondence and endless detailed labor and search as well as great expense. Professor Hoppin's life-long study of Greek vases, his many articles in this field and his recent book on *Euthymides and his Fellows* have made him one of the best authorities on vases and specially fitted for the task. Klein's memorable volume on *Meistersignaturen* has long been out-of-date and was not illustrated. Nicole's recent *Corpus des Céramistes Grecs*, published in a preliminary form in the *Revue Archéologique* IV, 1916 pp. 373-412, which is to form part of a monumental *Recueil archéologique Paul Milliet* containing all the literature pertaining to all the Greek artists, is also not illustrated and does not give the fifty or more nameless painters whom Beazley (cf. *The Art Bulletin*, vol. II, p. 42), the most important scholar in this field, has identified, many of them—like the Achilles, Pan, Berlin amphora, and Niobid painters—artists of the very first rank. All the artists identified by Beazley with a definite name are included by Professor Hoppin. I miss only the Painter of

the Bologna Bell-Krater with Perseus, the Painter of the Deepdene Trophy Amphora (put, however, *s. v.* Oreibelos), the Painter of the London Sleep and Death (mentioned *s. v.* Pamphaios, however), and the Painter of the Syracuse Pelike with Dionysos and a Silen (mentioned however, *s. v.* Nikosthenes and Pamphaios). Cf. Beazley, *Attic Red-Figured Vases in American Museums*, pp. 160, 194, 23, 132. The works of the artists identified by Beazley are not illustrated by Professor Hoppin and the material on them is all taken from Beazley, so that one who desires to know their style must go to Beazley, though Hoppin has brought together his lists in more practical form. We would have liked an illustration or two in the case of each to enable the reader to judge their style. For the other artists an illustration is given of every signed vase where it has been possible to secure one; and it is remarkable how few (less than 25) could not be secured, considering the difficulties due to the European war. The material from Petrograd and from Austria and Germany naturally shows the biggest *lacunae*. In several cases vases have disappeared and cannot be located. In many cases good illustrations of signed vases appear here for the first time and in some cases new signed vases such as my Talaos pyxis are here first published. The material is marshalled with full bibliography (sometimes badly arranged) under the various painters and potters in a numerical order alphabetically by cities and their museums, the signed vases followed by the attributed vases and by a list of subjects and shapes employed by each master and sometimes by a third list of other attributions. For the sake of completeness it might have been well to mention Praxias whose activity lay in Athens, even if he was not an Athenian but a Metec, and even though the red-figured amphora signed by him (Klein p. 31) has disappeared. Thyphethides might also have been mentioned (Brit. Mus. III, E 4) even if the cylix in the British Museum is not his.

The present work is invaluable to the student in many respects and will save much labor. Captions at

the top of the pages, at least of the names of the artists, would have made it easier to find references given to artists, as in the index, and not to pages. I cannot feel that the intention to publish "plates large enough to reproduce the artists' work in a form sufficient to permit the analysis of stylistic details" has been carried out with entire success. In general, the illustrations are excellent but in many cases conclusions as to stylistic details cannot be based on them, and the student of style must go to larger publications and to the vases themselves. A work of this kind with its infinite detail and countless references even despite the verification of every reference, as stated in the preface, is sure to have several minor slips and misprints, especially in the inscriptions. Only because this work is so important and because its importance consists in being complete and accurate in detail, do I venture to point out some of the more important. Many in vol. I are already corrected in the Addenda in vol. II, pp. 487-494. The mistakes in the indices are easily corrected and so I omit them. P. 10. Not the god Ares but the goddess of revenge, *Aré* is represented. P. 25, No. 26 has been published by Luce in the *Philadelphia Museum Journal* 1917, pp. 25f. figs. 5-6. P. 49. To bibliography add *Oesterr. Jahreshefte* 1909, p. 100. P. 77. Under the Painter of the Berlin Nike Hydra it would be better to place the vases in New York given as nos. 25, 26 under the Niobid Painter, vol. II, pp. 240, 241 (cf. Beazley, *V. A.* p. 152) P. 106. Tonks' Brygos is published in *Memoirs of the American Academy of Arts and Sciences*, xiii, pp. 65-117. To the bibliography add Malmberg, *Jour. Minist. Instr. publ. russe*, June 1906, pp. 97 ff. and Vik, *Vom Atelier des Brygos*, Prague, 1915. P. 130. Add cylix in Florence attributed to Brygos by Tosi in *Atene e Roma* 1917, pp. 190 ff. P. 134. Add Miss Lamb's kotyle in style of Brygos like that from Rhitsona (p. 140, no. 100 published not by Beazley but by Burrows and Ure; corrected by Hoppin in vol. II, p. 489 to Burrows and Ure), which she published in *J. H. S.* 1918, p. 31, pl. IV

(formerly in Hope Collection). P. 140. Add cylix in Villa Giulia (like no. 4, p. 110) attributed to Brygos in *Boll. d'Arte* 1916, p. 343. P. 178. Add cylix from Vignanello attributed to Chachrylion in *Not. Scav.* 1916, pp. 37-86. P. 284. No. 80. I. The inscription is wrongly divided and in index II, p. 524 wrongly interpreted. P. 284, note 1, Read skolion (a drinking song) for scholion and the reference to Theognis should be to l. 939, not 949. P. 298 has several mistakes in the inscriptions, if the illustration on p. 299 is correct. Agamemmon is omitted, Kymothea should be read, not Kymathea, as on p. 346, no. 4. Read Oukalegon for Oukalygon. In Achilles and Antilochus the forms of chi and sigma differ from the illustration and in Epigenes the form of gamma is wrong; the last omicron is omitted in Patroklos but given in the illustration, etc. P. 320. In inscription ET, seen in illustration, is omitted in inscription of Epiktetos. P. 362 and 366. Rho differs in the inscription from the illustration. P. 396. Inscriptions for B. are omitted but given in addenda vol. II, p. 493 but even there—*las kalos* is omitted. P. 404. For names of the hetairae refer to Robert in *Hermes*, 1905, p. 480. P. 410, note. The reference to Sappho should be to Bergk, *P. L. Gr.*⁴ III, p. 97, frag. 23 and the Greek verbs should be interchanged. P. 419. Add the three or four cylices attributed to Euphronius or Onesimus in *Boll. d'Arte*, 1916, pp. 343, 344. P. 421. In inscription the sigma exists at end of Panaitios. P. 430. Two mistakes in accent in inscription.

Vol. II, p. 3. 2 a is part of a calyx krater, not a column krater. P. 3, no. 4. Transpose A and B. P. 4, no. 6. Inscription probably should be *Chaire su*; no. 7, the inscriptions *kale he pais* and *kalos* are omitted (*J. H. S.* 1916, p. 129). No. 9 in Beazley's list (Florence 3999. A.) is also omitted. For no. 10 read two men for two women. Pp. 10, 11 the illustration is wrong as also in F. R. pl. 93. The signature of Hegesiboulos should be read backwards and the Attic forms of gamma and lambda with angle at bottom are perfectly clear on the vase, no Ionic lambda as Hoppin gives it. P. 17. Only last two letters of *epoiesen* can be seen in illustra-

tion. P. 20. Only four letters of signature are given when illustration shows all preserved. P. 22. In the signature of Hermonax sigma should be the same in all cases, four-barred. P. 46. Read Jhb. 1917 for 1916. P. 80. Refer to Gardner's *Principles of Greek Art*, p. 270 and Huddilston, *Lessons from Greek Pottery*, p. 74. P. 86. Add reference to *Boll. d'Arte*, 1916, p. 343. P. 116. Inscription on I not given as in Walters, as is said. P. 130, no. 4. read stove for stone as Beazley does. The catalogue says a distaff, not a mirror, and a basket with handle and three feet, not a stove or stone. P. 132, no. 1. Under A delete the two letters given at the beginning of the inscriptions and put under A the inscriptions wrongly put under B. Bracket first letter of Hippokles. For Silens read Silen. P. 138 delete second letter in first inscription of A. Xanthippe is not retrograde and sigma is three-barred and theta dotted. Other inscriptions badly reproduced. *Kalos* is probably meant. P. 141, no. 10. Read *V. A.* p. 42, fig. 24, for p. 68. Pp. 144, 145, nos. 25, 29. Refer to Beazley, *V. A.* p. 43, and Lützow, *Münchener Antiken*, pl. 29. P. 164, no. 6 B. Read man for men. P. 180. No second iota in *Hygieia*. P. 200. Two New York vases of the Meletos painter are omitted (12. 236. 1 and 2). See *J. H. S.* 1914, pp. 195, 226 and *V. A.* p. 166. P. 202. For *Sitzber. Münch. Akad.* III, read II. Inscriptions badly given. M in *Artemidos* is preserved. Hoppin wrongly here and in index reads *Kothon* for *Skonthon*, which is clear in the illustration and which I explained in *A. J. A.* 1908, pp. 431 ff. He omits entirely the name of one of the horses, P[ist]ô as given by Mrs. Dohan (Miss Hall). P. 206. Final letter of all three words in signature wrongly given. P. 208, no. 8. Transpose A and B. P. 213. Add New York pelike 06. 1021.144. P. 233, no. 7. Sambon pl. 15 should be pl. 16. P. 237. Add Bonn fragment in *Jahrbuch.* 1899, p. 166; *V. A.* p. 195. P. 239 transpose A. and B. P. 245. Add Beazley's no. 46 (*V. A.* p. 150) from S. Russia published in *Bull. Com. Imp. Arch.*, 1911, p. 50, figs. 5-7. P. 247. It is hardly correct to say that the name Memnon occurs only on vases attributed to

Oltos (cf. cylix of Chelis in Hoppin, vol. I, p. 186, of *Euergides* p. 373, no. 28, p. 374, no. 32) even if by name is meant the *kalos* name. P. 248. Inscriptions badly given. A. the t is omitted in *Antilochos*. B. Delete IT. P. 250, note 1. The vase mentioned by Reinach is undoubtedly the modern copy which I saw exhibited in the Louvre a few years ago and which is still there, I think. There are similar copies by the same hand of the Oltos cylix in the Vatican and in Mr. Warren's collection at Lewes (cf. my remarks in *A. J. A.* 1917, p. 167). P. 253, no. 13. Inscription badly given. P. 261, no. 47 C. The Baltimore Oltos fragment was published by me in *A. J. A.* 1917, pp. 159 ff. with illustrations. P. 262. Add to other attributions to Oltos Nicosthenes 4 (Beazley, *V. A.* p. 10, no. 11) and Hartwig, pl. VI. On p. 272 twice and in index the Greek verb is wrongly given as *prosagareuo* for *prosagoreuo*. P. 280 ff. For *Bonner Stud.* read *Bonner Stud. dem Kekulé gewidmet* 1890. P. 313¹ read *acquired*. P. 327. Inscription has two mistakes. P. 334. Under Graef read no. 69 for p. 69. In A inscriptions badly given. P. 360. For *Hydrophoriae* read *Hydrophoroi*. P. 380 A. Next two letters to last reversed. P. 391. Two other vases attributed to the Providence Painter are at Oxford, Hoppin's no. 10 and Oxford 277 (A. Athena. B. King) omitted by Hoppin but attributed to that painter by Beazley *V. A.* p. 194. P. 394, no. 45 is out of order.

Let no one think that the comparatively few minor errors in these two volumes detract from their scholarly character and usefulness to students of art in general and of Greek ceramics in particular. This is one of the most valuable contributions and practical helps to the study of Greek vases that has appeared in recent years, and the many fine indices add immensely to its value. Professor Hoppin and the Harvard Press are to be congratulated on being able to produce in America such a work, which for the first time makes every signed or attributed vase practically accessible to the student.

David M. Robinson.

NOTES

THE NINTH ANNUAL MEETING OF THE COLLEGE ART ASSOCIATION OF AMERICA

At the invitation of the Cleveland Museum of Art the committee on time and place has decided to hold the ninth annual meeting of the College Art Association of America at the Cleveland Museum of Art, Cleveland, Ohio, Thursday, Friday, and Saturday, April 1, 2 and 3, 1920. Preparations for a large attendance are already under way. A number of interesting speakers are assured, and provision is being made for the entertainment of members and guests of the Association. The local committee on arrangements is at work on its part of the program, and it is expected that access to important art collections in Cleveland and vicinity will be secured. The Cleveland Museum of Art has generously placed all its resources at the disposal of the Association.

RECENT CONTRIBUTIONS TO ART HISTORY

The gradual resumption of the relations of peace has brought many surprises and perhaps not the least among them is the discovery that our enemies remained remarkably active in research throughout the war. Their published material of the past few years is now being received so rapidly that it is difficult to keep pace with it. It seems useful, therefore, to call attention to a few studies of uncommon interest which might otherwise fail of the notice they deserve.

Leonardo da Vinci is too bright a star to be dimmed by clouds of powder smoke. During the last five years, partly because of the celebration of the fourth centennial of his death, he has more than any other artist en-

gaged the activity of students of art history. Of their contributions the most fascinating and probably the most significant is that concerning Leonardo's equestrian works published by Simon Meller in the *Jahrbuch der Preuss. Kunstsammlungen*, vol. XXXVII, 1916, pp. 213-250. For a period of twenty-five years Leonardo worked at the problem of the representation of horse and rider. The fate of the monuments for which his studies were made is well known: the painting of the Battle of Anghiari soon faded from the walls of the Palazzo Vecchio in Florence; the Sforza monument was made ready for casting, but the great clay model, after the fall of the Sforzas, was destroyed; the Trivulzio monument did not reach even its final model. Our knowledge of these works has heretofore been based upon drawings and inadequate descriptions. But reproductions of Leonardo's models for the two equestrian monuments are recognized by Meller in a Milanese engraving, in drawings by followers, and in two small bronzes. The engraving shows four equestrian groups. It has usually been regarded as derived from Leonardo's drawings, but the small rectangular pedestal in each case and the tree trunk used as support in two cases indicate that the groups are copied from models. The vanquished warrior in one of the groups tallies exactly with a statuette in the Trivulzio collection, Milan (Pl. XIV, fig. 1). Our knowledge of Leonardo's last equestrian undertaking, the Trivulzio monument, has always been meager. Now, however, according to Meller, we may see in a little bronze lately acquired by the Budapest Museum a casting of one of Leonardo's models for that monument (Pl. XIV, fig. 2). The peculiarities of the horse—for example, the broad back and the bulging, serpentine neck—as well as of the pose of the rider, are found in Leonardo's contemporaneous drawings.

More than a generation has devoted itself to the reconstruction of the archaeological setting of Homeric times, while the corresponding study of the northern age of epic has been largely neglected. Readers of Beowulf and of the Niebelungenlied will be interested

PLATE XIV.



Fig. 1—MILAN, TRIVULZIO COLLECTION: BRONZE STATUETTE FROM LEONARDO'S MODEL FOR THE SFORZA MONUMENT.



Fig. 2—BUDAPEST, MUSEUM: BRONZE STATUETTE FROM LEONARDO'S MODEL FOR THE TRIVULZIO MONUMENT.



Fig. 3—NARANCO: STA. MARIA. EXTERIOR WITHOUT LATER ADDITIONS.



Fig. 4—NARANCO: STA. MARIA. INTERIOR IN ITS ORIGINAL CONDITION.



in the recognition in the so-called church of Sta. Maria at Naranco in Spain of such a hall as that of Heorot and that of Kriemhilden. Albrecht Haupt, in *Monatshefte für Kunstwissenschaft*, vol. IX, 1916, pp. 242-263, gives a fuller account of this structure than in his earlier book and, by distinguishing the kernel of the building from later additions, brings to light a perfect eighth century example of the old king's hall (Pl. XIV, fig. 3). The building has a ground story divided into three rooms, above this is the long hall, with an outlook room at each end. The hall is entered from each side through a raised portico reached by a pair of steps. The location is on a hillside, and to the discrepancy in ground level corresponds the arrangement at the entrances. On the side toward the hill, where the king entered, a few steps led down from the portico to the floor of the hall; on the opposite side steps led up. Though the building has a gable roof externally, its interior is barrel-vaulted (Pl. XIV, fig. 4). The hall is divided into seven bays and is lighted through the outlook rooms at the ends. This is, in paradigmatic purity, the type of hall whose history we can trace from the reception-hall of Attila described by Priscus (not to mention Valhalla) through various Carolingian and Scandinavian examples down to the Renaissance Lusthaus at Stuttgart.

Americans have become somewhat accustomed, though not indifferent, to seeing the prerogative of first publication of objects in American collections given to foreigners. Seldom, however, has such publication been made the basis of so far reaching an investigation as it is in the case of the Albanian treasure of the Morgan collection. Josef Strzygowski in his *Altai-Iran und Völkerwanderung*, Leipzig, 1917, takes this treasure as point of departure for the study of the influences exerted by the ornament of central Asia upon that of western Asia and Europe. Géza Supka has already pointed out linguistic connections between the treasure of Nagyszentmiklós and central Asia and more recently discovers many Buddhistic traces in the art of the barbarian invaders. Strzygowski traces the ornament of